The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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Sectional Tubulous Boiler by Messrs. Babcock & Wilcox.

The sectional boiler of Messrs. Babcock & Wilcox, which we illustrate, differs in so many important respects from many of those which have been put upon the market that a detailed description of them will not only be of interest to our readers, but also useful to those who have to provide power for manufacturing operations. Our first illustration represents a longitudinal vertical section of the boiler, with an external view of one of the drums. The second cut shows a partial rear elevation, with a section through tubes and brickwork. The boiler consists of a series of lap welded iron tubes, inclined at an angle, which are connected at either end by vertical connections to a cylindrical drum lying horizontally above them, the inclined tubes being always full of water; the level of which is maintained at about the center of the hight of the drum. Below the tubes, at the back, and in connection with them, is a smaller drum in which the mud and sediment from the water collects. Even lime scale, washed out from the tubes by rapid circulation, is carried over and lodged here or at quiet portions of the drum.

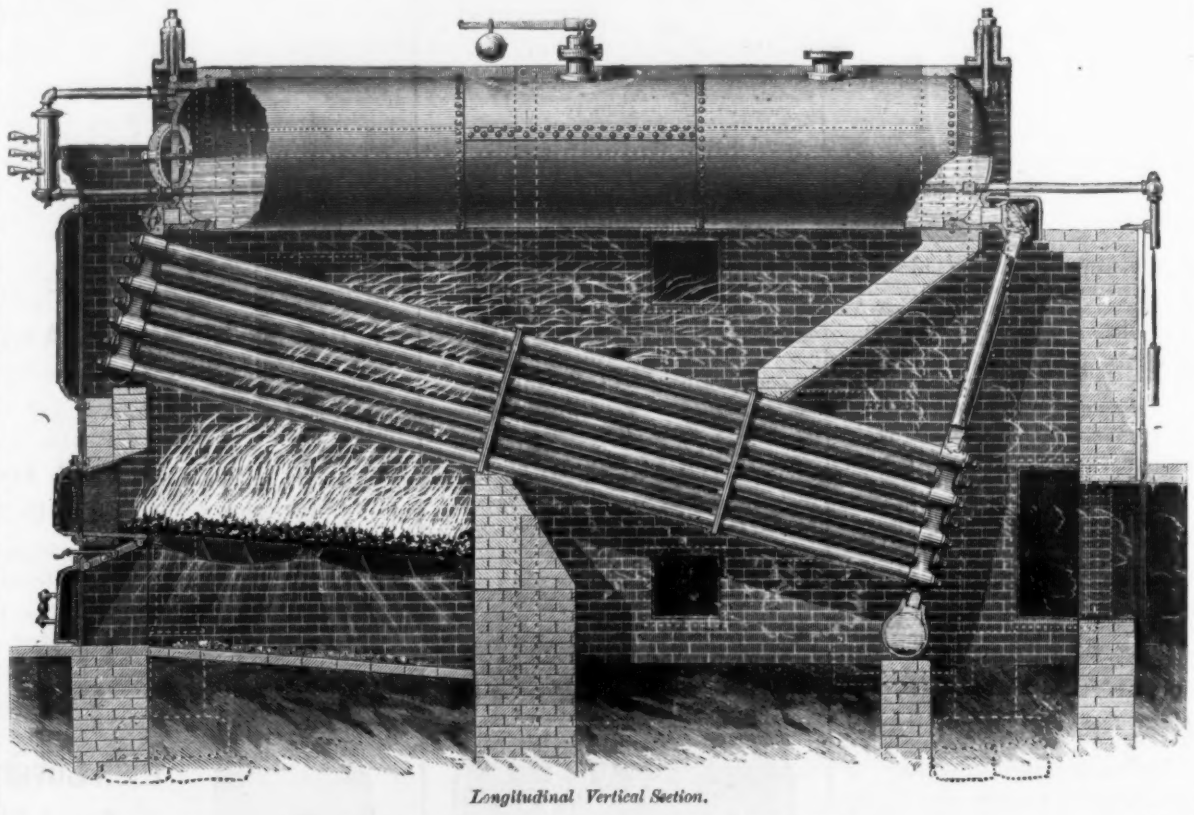
The following are some of the results of this form of construction: That the circulation of water is thorough; anything of a sedimentary nature in the water is deposited where there is no circulation, *i. e.* in the mud drum. The higher ends of the tubes being subjected to the hottest part of the fire, the escape of the steam there formed, together with a part of the highly heated water, will all take place through the connections into the drums at the front end, the cooler water falling through the connecting pipes at the back, to maintain the hydrostatic level, and in this way a continuous and rapid circulation is kept up. Heretofore joints and connections have, in sectional boilers, given a great deal of trouble and annoyance. This difficulty is avoided in the following manner: The end connections are single steel castings into which the tubes are expanded, the openings opposite the tube ends being closed by plates having ground joints, metal to metal, without any organic or perishable substance whatever between. The structure as a whole is in the form of a triangle, the drums, back connecting tubes, and the inclined nest over the fire, constituting the three sides. With this general form, expansion may take place in one or two of the sides of the triangle without resulting in anything more than a slight transverse strain in the connecting tubes at the back or front far within their elastic limit, and therefore without danger of rupture or leakage, such as is found in boilers having members in the same line of strain, some of which are subjected to the direct action of the fire, while others never exceed in temperature that of the water. The expansion and contraction may, moreover, take place freely in this boiler, from the fact that the whole metallic structure constituting it is suspended from girders, resting upon cast iron columns entirely independent of the brickwork, thus avoiding all tendency to crack or strain the walls; a source of much trouble and expense with some forms of boiler, and in many cases causing considerable loss of fuel from cold air leaks through fissures in the brickwork produced in this way.

Mr. J. T. Haskins, the well known mechanical engineer, in making a report upon the construction and efficiency of the boiler, says: "The absorption and transfer of heat is well provided for in the staggering of the tubes, which causes the gases from the fire to pass nearly their whole circumference; and by placing diaphraghm plates and transverse walls such as to cause them to make three distinct excursions between the tubes on their way to the chimney. That this boiler leaves as little heat to be passed away through the chimney as can be profitably done with the natural draught, was quite clearly established by the tests made upon it at the Centennial Exhibition."

He gives a summary of the results of these tests in several large tables, from which we take the following figures. He says, in introducing the tables, that "at these trials, although the indications of both the pyrometer in the flue and the thermometer in the steam drum were quite unreliable for any purpose requiring accuracy—as is, indeed, true generally of these instruments when so applied—a mean of their indications, liberally construed, was sufficient to establish that the difference of temperature between the steam and the gases in the flue, at a foot or two from the terminal gas passages of the boiler proper, was, on the forcing test—at which the consumption averaged over 15 lbs. of coal to the square foot of grate per hour—unusually small, and that the difference was proportionately less upon the economy test, at which very nearly 10 lbs. to the square foot of grate was burned. With ordinarily perfect combustion, these facts would indicate a high degree of economy; and the indications are fully borne out in the following results of the tests named above:"

The time for each of the tests was 8 hours; the heating surface, 1680 square feet; grate surface, 45 square feet; the pressure of steam, in each case, 70 pounds.

	Tests. Normal.	Forcing.
Lbs. of coal burned	3,414¾	5,241
Ashes	391	424
Kindling wood	352	410
Temperature of feed, Fah	63·97°	57·79°
Lbs. of water evaporated	32,442	43,525¾
Lbs. of water per pound of coal at temperature of feed	9·126	8·7
Lbs. of water per lb. of coal from and at 212° Fah	10·82	9·61
Lbs. of water per lb. of combustible at temperature of feed	10·25	8·74
Horse-power at temperature of feed	135	180



Longitudinal Vertical Section.

SECTIONAL TUBULOUS BOILER BY MESSRS. BABCOCK & WILCOX.

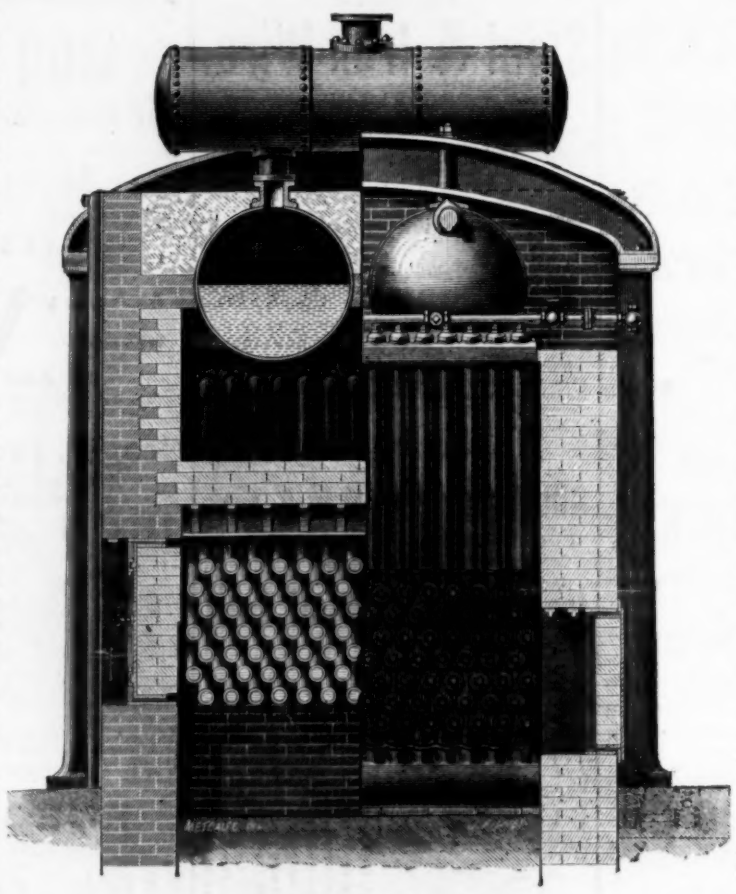
If the temperature of the feed water had been calculated at 212° the evaporation per pound of combustible would have been, in the normal test, 12·17 pounds, and in the forcing test 10·54 pounds. Under the same conditions of feed water at 212° the horse-power obtained would have been for the normal test 157, and for the forcing 212 horse-power. The curious fact was developed during the test that when boilers were forced there was less priming than when they were working at the normal capacity. The quantity of water found in the steam was so small that upon the examination of the figures it was found in each case that the figures were within the limits of error of observation. In regard to this point Mr. Haskins says:

"Although this boiler has no steam heating surface the amount of water contained in the steam is exceedingly small, being but ·213 per cent. on the maximum test, and 2·28 per cent. on the normal test. Thus the steam upon the forcing test was practically dry saturated, containing the number of heat units due its temperature and pressure, while on the economy test it made a very near approach to these conditions.

"The dryness of the steam from this boiler, without superheating surface, is doubtless due to the large water surface, or steam disengaging area, and steam space in the drums. In many boilers not provided with sufficient disengaging surface and steam room—under a high rate of combustion, especially—the escape of the steam from the insufficient surface is of so violent a character as to carry with it mechanically a large amount of water, which subsequently has no opportunity to become disentangled from the steam before reaching the engine; and this is particularly true of some forms of sectional boiler. In this case, although issuing from the front ends of the tubes, doubtless with great energy, the steam has abundant opportunity to become separated from what water it may mechanically carry up into the front end of the drum—aside from the large quantities passing this way from the natural convection currents which cause the rapid circulation—and become dry before issuing at the back end, whence the steam is taken to the engine. As is shown by a comparison of the calorimeter experiments, the steam is actually dryer when the boiler is forced than when working under normal conditions, and this is no small advantage, as most boilers will prime over considerable quantities of water when forced beyond their ordinary capacity.

"The large disengaging surface in the steam drums also gives this boiler a desirable advantage in rendering the maintenance of the water level an easy task; and this is a very generally weak point in sectional boilers.

"These boilers are excellently devised with reference to accessibility for repairs and cleaning. The hand hole plates opposite the ends of the tubes, when removed, leave openings of the full size of the interior of the tube. The large drums are provided with manholes and plates, and on the ends of the mud drum detachable bonnets are secured, whose removal permits of the extraction of accumulated sediment. The exterior of the tubes may be operated upon through openings in the side walls, by blowing, brushing, or any of the well known methods of removal of the accumulation of dry dust, soot and ashes which are incidental to all boiler fire surfaces."



Rear Elevation and Section.

Messrs. Babcock & Wilcox are now erecting for the F. O. Mathieson & Weichers Sugar Refining Company, at Jersey City, 21 boilers of this kind, of some 1700 total horse-power. This firm have had boilers of 300 horse power of this kind at work for four years. In sugar works economy and capacity are two essentials in boilers, and therefore such a large order from a sugar house has especial significance. The firm are also erecting for the Brooklyn Sugar Refining Company, Brooklyn, E. D., 12 boilers of 1000 horse-power.

There is to be cast at the South Boston Foundry, during the present week, a 12 inch rifled gun. The weight of this piece of ordnance when finished will be about 90,000 pounds, and it will carry a projectile weighing about 700 pounds. The ordinary charge of powder in firing it will be from 110 to 140 pounds, with which the projectile will pierce a solid mass of iron from 12 to 15 inches thick at a distance of 1000 yards. The gun will be made of cast iron, lined with a wrought iron cored tube, and when finished will be sent to proving the ground at Sandy Hook to be tested, and if found to be satisfactory will be mounted in one of the fortifications in New York harbor. General Benet, Chief of the Bureau of Ordnance; Colonel Brisbin, the Ordnance Constructor, and other prominent ordnance officers will witness the casting on Wednesday. This gun will be made on a system which will be thoroughly tested in this country on guns of smaller caliber, which have been found to equal any guns made abroad. The work upon it was commenced nearly a year ago, and the greatest care has been taken to select proper metal to be used in its construction.

At the last meeting of the Philadelphia Academy of Sciences, Mr. John Ford described a group of eight burial mounds opened by him near Coup's Creek, Macoupin county, Ill. Each of the graves was lined with stone slabs, and after the bodies were placed in position within, earth had been packed around them so as to fill the inclosure. All the skeletons found in these graves faced the East. In one of the graves four skeletons were found, seated in two pairs, the knees of one pair pressing against the backs of the other. The arms were crossed. In the right hand of each individual thus interred, a large marine shell (*Buccinum perversum*, Linn.) had been so placed that the small end of the shell rested in the hand and the large end in the hollow above the left hip. Within each shell what appeared to be the bones of a child were found, whose skull had been crushed before burial, the skull protruding beyond the aperture of the shell. It is thought that these infants were sacrificed to the dead. In most of the graves the left side of the skulls of the adults appeared also to have been crushed by some blunt weapon.

The Ashtabula Bridge Disaster.

The report of the joint committee of the Ohio Legislature on the Ashtabula bridge disaster is a pamphlet of over 150 pages. We can only quote briefly. Of the defects in the construction of the bridge, the committee say:

The members composing each main brace were so constructed as to act separately instead of acting as one member, thus reducing the carrying capacity of the metal greatly below what it would have carried in safety if it had been differently disposed. There should have been diagonals riveted to each member of the brace, or other suitable arrangement to unite the members of each brace, so that the brace would have formed a truss, and have acted as one member instead of several. No provision was made to prevent lateral buckling or bending of the braces. The longer members were used in compression, and the shorter in tension. If the main braces and counters had been permanently fastened together at their intersection, which they were not, that would have added greatly to the strength of the main brace.

There was the same want of unity in the members composing the upper chord as in the main braces. No sufficient provision was made to prevent it from lateral buckling. In fact, at that point in the bridge which first gave way, both the braces and the top chord did buckle laterally. Only a part of the members composing the upper chord received the strain from the braces at each angle block or panel point, and the lugs on the top of the angle blocks, through which the strain was transmitted to the upper chord, it is believed, were insufficient for that purpose.

The lateral system between the lower chords was defective in this: the struts were placed at every other panel point, and the tie rods extended across two panels, and, instead of being fastened at the ends of the struts, were fastened at alternate panel points, crossing each other at the middle of the strut. The sway braces were too small and too infrequent.

The lateral system between the upper chords had the same defects as that between the lower chords, with this exception: the floor beams had small lugs united to them, and they acted as struts.

No provision was made for holding the members comprising the braces in their places on the angle blocks, and your committee find that many of them were out of place before, and at the time the bridge went down. The braces were greatly weakened by imperfect bearings, and having their ends chipped off.

A careful calculation showed that the bridge laid down under a load not greater than was liable to be thrown upon it any time in the ordinary and usual traffic over it. The south truss at the time of the accident supported only 95 per cent. of the weight of the one train on the bridge. The bridge carried a double track. It was so designed, and trains did frequently meet on the bridge. There being but two trusses when trains met, each truss must carry the entire weight of one train; and yet, with only 95 per cent. of the weight of the train on the south truss at the time of the accident, it gave way. A careful and patient calculation of the strength of the brace at the point of failure (third panel point from the west end of the south truss), and of the strain upon it under that load, shows that it had a factor of safety of only one and six-tenths, when ordinary prudence and foresight required it to have a factor of safety of five, and the upper chord from the third panel point to the center of the bridge, numbering from west end, had a factor of safety at the several panel points ranging from two to one and two-tenths instead of five.

The report of the civil engineers employed by the legislative committee, who were Messrs. B. F. Bowen, Thomas H. Johnson and John Graham, of Columbus, Ohio, gives a detailed technical description of the bridge, and while pointing out the defects in construction, it expressed the opinion that the material used was excellent, and "excepting the brace bearings, the workmanship was very superior;" that there is nothing in the failure to justify the popular apprehension that there may be some inherent defect in iron as a material for bridges; and that the failure of the bridge was not due to any defective quality in the iron, or the "result of a weakness gradually developed after the erection of the bridge," but "simply to the fact that it was not constructed in accordance with certain well established engineering principles."

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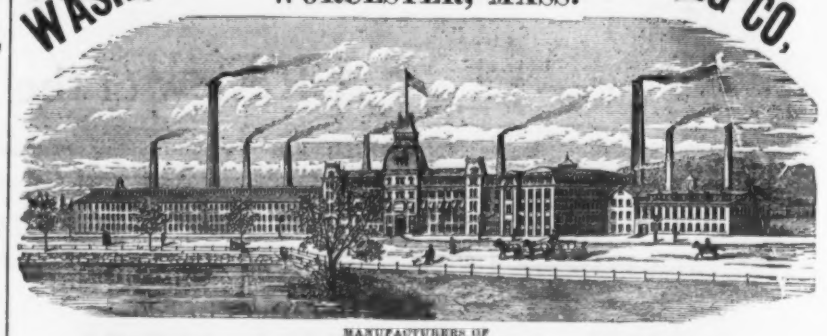

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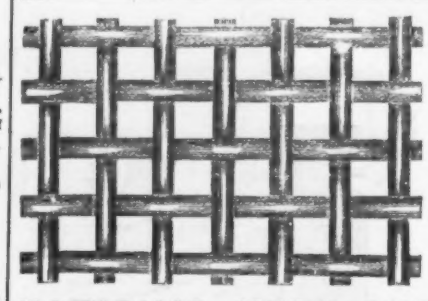

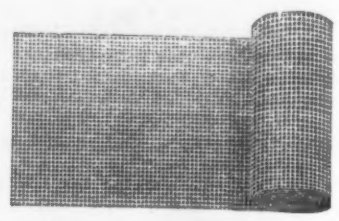

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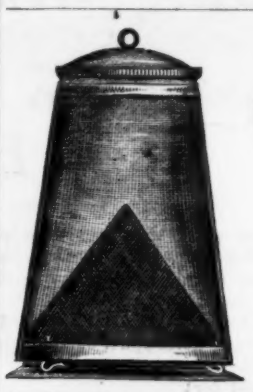

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A New Direct Process.

(Concluded.)

REVIEW OF MR. PECKHAM'S METHOD.

It is impossible to produce a neutral and valuable iron from certain ores by the process usually adopted in the blast furnace at the present day. This process is, in its principle, a double one: I. reducing the ore into a state of cast iron; that is, by making it take a very large amount (2 to 4 per cent.) of carbon, in which state it is easily fusible, then running it out in pigs, and then II. oxydizing out the carbon as in the puddling furnace, and so reducing it to wrought iron. Mr. Peckham's method, summarily, consists in heating the ore in the presence of carbon in air-tight crucibles, or retorts, at successively increased, but uniformly maintained, temperatures, commencing at a very low heat. He then transfers the treated ore, or resulting metallic iron, while yet hot, and without exposure to cold air, to a forge fire, wherein it is worked. This is clearly the result of long continued experimenting in accordance with the above principles. The important excellence of Mr. Peckham's process is several fold, but it comprises a thoroughly digested practical way of economically producing the purest iron from the native ore. In his process the ore is mixed in proper proportion with the charcoal let in upon the uppermost shelf, or floor, of a horizontal crucible; there it receives the advantage of the first roasting in connection with the charcoal and the carbonic oxide, and by means of the heat remarkably well economized from the fire of the hearth. Here it loses largely its first volatile parts, including sulphur and vapor. It is then passed downward from the rear by drawing the roasted ore down through valves, or sliding doors, and let fall upon the next lower crucible floor, where it readily takes up more carbon, which combines with the remaining oxygen of the ore and passes off. It begins now to become metallic iron. The arrangement is a practical and a successful one, and the heat increasing at the next lower chamber, or crucible, reduces the ore more fully to the metallic condition.

Without exposure to the chilling contact with air, it is immediately drawn down upon the fire of the hearth and balled into the loup, and thence sent to the hammer to be made into blooms or billets. With an ore which we examined at the forge, the following results were obtained. The ore was brought to the forge in small grains. It was a magnetic ore whose specific gravity in its purest state when picked out from the heap of ore would be nearly 5·25, but in the mass of particles was about 2·70; that is, a cubic foot of that mass as it occurs in the ore heap weighs about 169 lbs.. The mass contained of silicious material 2·727 per cent.; that is, of every 200 lbs. there were about 2¼ lbs. of almost colorless quartz or flint particles, all the rest were more or less magnetic ore. The analysis of this ore, taking the average of eleven fire assays, gave nearly 63 per cent. metallic iron. The other ingredients of the ore are very small traces of phosphoric acid sulphur, with manganese, titanic acid and silicon. This ore in grains averaging one sixteenth of an inch, mixed with charcoal braze, was introduced as above stated. The charges were passed down as already described. Two samples of the iron were billeted and drawn into bars of small size merchant iron. These were examined, as also the slag run off from the hearth, the latter for reasons hereafter to be stated. After carefully cutting the iron surface away there were taken pieces from two distinct brands very slightly but decidedly differing, which difference may be owing to the manner in which the prepared ore was worked in the reducing fire. One brand marked U, made in the usual manner, was an iron of exceedingly high tensile strength—we should say about 89,000 lbs. to the inch—very compact, presenting several of of the virtues of carbon steel, and yet, after several assays for carbon, presenting about the following average result of analyses:

99·8760 iron
·0025 manganic oxide (Mn O2)
·0020 silicic acid
·0110 sulphur
trace phosphorus
·0210 titanic acid
·0150 carbon
no cinder

99·9275 I think a trace of nickel.

The other brand marked W W was made, as I am informed, by working the reducing fire hotter, so as to make the cinder more liquid, and to separate it more perfectly from the iron. A great bath of cinder was retained in the fire during its manipulation so as to protect the loup from the oxidizing effect of the blast. It, however, was a softer iron, but of singular and very unusual purity. In the bar it worked as perfectly neutral iron; was similar to the other excepting that it contained considerable carbon, several analyses making it about:

99·8990 metallic iron.
·0264 titanic acid.
supposed trace of nickel.
·0159 silicic acid (?·1 oz to the ton).
trace slag or cinder.
·0350 carbon.
·0130 manganic oxide.
supposed trace of sulphur.
·0015 phosphoric acid (?)

99·9908

One amount taken for examination was 3·046 grammes, about 47 grains, others smaller.

In the above extreme decimals we cannot assure certainty, but only what we think to be the nearest average on repeated assays.

The iron compares very favorably with the finest piano wire, and there is no commercial iron—not even the best Swedish iron—which can be reasonably considered superior for the large majority of purposes to which wrought iron is usually put. One remarkable characteristic of this iron is its exceeding tenacity and toughness. In comparison with a very good iron from another ore, made on the Lehigh, Pa., and which sustained nearly 60,000 to the inch, under a trial I had made at Reading, Pa., this iron will certainly reach 84,000 as its tensile strength, while its tenacity seems due largely, to the presence of titanium, or to manganese, the process through which it passes in the forge, as under the patent of Mr. Peckham, purifies the ore by heat and contact with charcoal before the entire deoxidization and renders its condition better for the forge fire than by any other process. In proof of this we obtained a piece of iron formed from the same ore by the same kind of coal in the usual Catalan method. The iron was harsh, due to the largely increased silicon and cinder with other elements which remained in the iron. In Mr. Peckham's process these impurities passed more largely into the slag or mill cinder, which we carefully examined for the proof. The gradual roasting and deoxygenating process of Mr. Peckham, when properly carried out, is the best method of treating all ores before reducing them on the melting hearth, for the following reasons: I. In the case of magnetic ores, although in theory these ores have a specific gravity of about 5, when broken down, as they should be and generally are in the Lake Champlain region, they only weigh about 169 lbs. to the cubic foot. By actual experiments in horizontal crucibles of about three-quarters of an inch thickness of floor and sides, I found that after a low heat from 700° to 900° Fah., continued five hours and a half without any charcoal, there was produced a result I could not effect in the platinum crucible in the chemical laboratory, though continued a long time over the blast lamp. The action of fire brick without, and then with charcoal, has its peculiar efficacy. The crucibles at the earliest stage need not be very closely shut up, as the heat should not be enough to ignite the coal, except where an actual draught passes over the coal. This draught never occurs in Mr. Peckham's crucibles. In the use of the specular red ore, or more open red hematites, the time may be reduced from six to four and a half or five hours. There is much gained by keeping the ore heated fully up to five hours.

Although this process is peculiarly adapted to the richer magnetic and specular, or heavy hematite ores, it can be used in the case of the heaviest brown hematites. Selecting some of the best Pennsylvania brown hematites and using charcoal, roasting and reducing, I have produced a very malleable, neutral wrought iron, capable of being cemented into carbon steel of a very fine quality. A blacksmith, not far from Easton, Pa., erected a small Catalan hearth, and reduced quite a quantity of brown hematite, forming an iron quite good enough for horseshoe nails. For toughness and firmness, however, the iron does not equal the Lake Champlain iron already described. II. After the first process it is absolutely necessary, gradually, to increase the heat to red. It is an essential element in Mr. Peckham's method, and of his previous success, that the regulation of heat be observed strictly. I found that the raw ore was reduced from 169 lbs. per cubic foot to 167 lbs. after roasting in a very low, not red heat, 5 to 6 hours without any charcoal, but afterward I added 1⅛ its bulk of coal, and in 8 hours reduced the weight to 130 lbs. Absolute deoxygenation would, theoretically, reduce the cubic foot of ore in weight to only 116 lbs. Let a cubic foot box or one quarter of such a box be made, and let the superintendent approximate 30 lbs. in weight for the deoxygenated ore in the ¼ foot box. Let him examine and handle this amount of ore until he can judge of its condition without weighing. A box 7·5 on the inside measurement every way, furnished with a handle, will answer the purpose.

If all the economies we have stated in this report are carefully studied and carried out strictly and intelligently, as they can be by this process, the following results should be obtained.

1. By depriving the ore of its oxygen and transferring the resulting deoxidized ore called sponge while yet hot directly to the forge fire, a large per cent. of charcoal will be saved. Instead of 300 or 350 bushels of charcoal to the ton of iron, as in the ordinary Catalan forge, the amount should be reduced to 200 bushels of properly prepared charcoal, and by a thorough utilization of the heat, as proposed by Mr. Peckham, it may be reduced still further.

2. The ore being deprived of sulphur and other impurities, which may be eliminated or absorbed by the charcoal in the retorts, a much purer iron will be produced by this than by any other known process from the same ores.

3. By the treatment in the retorts, the particles of quartz or silex mixed with the ore become so thoroughly roasted and so nearly disintegrated that they, as a result, will separate more perfectly from the iron than when raw ore is used, and in consequence they will produce a milder natured cinder, and as the loup or ball produced partakes of the nature of the cinder the iron produced from the ore thus treated will be more satisfactory.

4. As the size or capacity of each section or story of the furnace and its heat may be varied as desired, the ore may be first deoxidized and then carbonized, and uniform steel be produced at once from the ore.

Lastly. The iron from this process has abundantly proved itself not only equal in purity to the same general wrought iron grade of foreign irons; but, so far as capability of manufacture is concerned, it can continually and uniformly be made fully equal in purity and strength to any foreign iron—Swedish or Lowmoor.

So far as tensile strength is concerned, there are magnetic ores on Lake Champlain, Lake Superior and in Missouri which, if carefully and intelligently treated, will excel any foreign irons at present imported. It should be remembered that irons containing any proportion of manganese or titanium do not require so long a time for forming the same quality of carbon steel, by what is known as the "cementation process," but should remain in the converting crucible a shorter time than should irons entirely free from those elements. The finest steel of the world, of the celebrated Damascus blades, was formed upon the same principle upon which Mr. Peckham proceeds in his process, especially in his most recently improved forge. But as for iron it is unquestionable that there is now made by Mr. Peckham's process and patent an iron which, aside of the reputation of Swedish irons would be found to be equally valuable for firmness, strength and commercial purity and use with the very best of Swedish brands which have been imported during the last ten years.

Although Mr. Peckham has not yet constructed his furnace in combination with a puddling furnace, so as to use anthracite or bituminous coal, I can see no good reason why he may not be able to accomplish good results with the best bituminous coal or coke, but we have treated of the main thing, which is thoroughly and economically to deoxidize the native ore. These two results have been fully effected in the manner and by the appliances we have fully presented.

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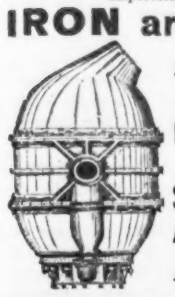
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Properties of Iron and Steel Constructions.

In Weyrauch's treatise on the "Strength and Calculation of Dimensions of Iron and Steel Constructions," we find the following:

EXCESS OF ELASTIC LIMIT.

The limit of elasticity is generally defined as that stress per square unit beyond which permanent changes of form occur, while under less stresses the body returns to its former condition. Reference is made, not to sudden changes in stress and shocks, but to gradually increasing strains. But the definition is theoretically worthless, for a limit so definite is not probable, and much less is it proved. On the contrary, Hodgkinson and Clark have observed that there are permanent changes of form under very small loads. At present we must be content with defining this limit with Fairbairn, as that stress below which the changes in form are approximately proportional to the forces, while above this they increase much more rapidly. The words "approximately" and "much" are not so indeterminate as might be supposed, for in the experiments of Bauschinger, the passage beyond the limit of elasticity could be determined very precisely; as, for example, in tension; "for with the same increase of load a disproportionately great elongation occurred at once, the maximum of which was in every case reached after some time." This sudden elongation must be credited to permanent changes of form; further elongations until near the breaking limit remain proportional to the stresses, and the modulus of elasticity is always found to be independent of the latter. In the first definition the changes of form which are permanent from Bauschinger's point of view are neglected. All experiments up to the present time have shown that when the elastic limit is passed the tensile resistance is considerably increased, while ductility and tenacity diminish, the metal becoming brittle and having little power of resistance to shock. In experiments at the Woolwich arsenal, an iron rod four times ruptured by pull, gave the successive values of t: 3520, 3803, 3978, 4186; Bauschinger tore apart a piece of iron seven times, and the resistance increased from 3200 to 4400.

Paget found that iron chains after stretching bore a greater dead weight, but had less resistance to shock. Fairbairn thought all these phenomena could be explained by the hypothesis that the resistance of all the parts was not at first called into action, but, like ropes, they became gradually strained in common under sufficient load. With this accords the fact that Bauschinger observed that increase of resistance, especially in rolled iron, was notably regular when the stress was in the direction of the fibers. The analogy holds further; for a rope when tense is more easily broken by shock. And this explains why a rod under sudden increase of stress breaks more readily than in case of gradually increasing pull.

When the limit of elasticity is passed, this limit is again raised. Tresca, in tests of rails, succeeded in pushing the limit of elasticity to near the limit of rupture, so that it was less by about one-tenth. The practice hitherto has been to assume as permissible stress (b) a fraction of the elastic limit. In this case b increases with the number of loads. But the material becomes more brittle and less resistant to shock, and local passages beyond elastic limits are not excluded. So that we need not assent to the often advocated opinion that a test of material beyond the elastic limit would be of advantage. It is worth mention that the increase of resistance with the passage beyond each limit cannot go on indefinitely; but a diminution must occur at some time, unless we assume that with very gradual increase of stresses and longer intervals the original resistance becomes greater than the initial ultimate strength.

Now, if passage beyond the elastic limit can work unfavorably, it should not be permitted. But it is enough to know that, according to the numerous experiments of Styffe and others upon all sorts of iron and steel, the ratio of elastic limit to ultimate strength generally lies between $\frac{1}{1.4}$ and $\frac{1}{1.8}$, and under the most favorable circumstances seldom reaches $\frac{1}{2}$.

Wertheim and Styffe have attempted to establish more precise definitions of the elastic limit, but as they are not better, either theoretically or practically, than others, it would be superfluous to consider them. It is since the time of Hodgkinson and Clark that an empirical importance has attached to this limit; and it is still very narrow in its scope, because the limit, as above defined, is of no avail in case of sudden change of strain and of repeated stresses.

Vicat made experiments to determine the effect of lapse of time upon a dead load. He kept wires loaded up to three-fourths the tensile resistance during thirty-three months. The one with heaviest load broke. Vicat inferred from this, and because the extension seemed to be proportional to the time, that every load beyond the elastic limit would, after lapse of time, cause rupture. Considering that very small loads cause permanent changes in form, it would be more correct to infer that any load, if given time enough, will cause rupture. Fairbairn thought he could prove this by tests on cast iron girders. But we do not find that the results of his experiments warrants his conclusion. But the fact that under stress beyond the elastic limit the ultimate strength increases, leads to the conclusion that security against dead load increases with time. But if it is objected that a decrease may follow an increase of ultimate strength it must be admitted, in view of all that has been said, that the influence of duration of dead load has not been clearly determined. That each load requires a certain time to cause its correspondent permanent change has been known since the time of Hodgkinson and Wertheim, and also accords with Fairbairn's comparison with ropes; and, again, it has been observed by Bauschinger. This also holds true for further changes in form; and if a rod stretched again when released, does not at once return to its previous condition a so-called secondary action takes place. This was observed in Kupffer's experiments. Thurston thinks that in this he has discovered a new phenomenon; that ultimate strength and elastic limit increase after a strain greater than the latter, continued for twenty-four hours. But there is nothing new in it. That the tensile resistance of iron and steel is greater under the action of an electric current, and that the ductility is effected, now one way, now another, by dipping the metal in acid, seem to be shown by detached experiments, but this needs confirmation.

INFLUENCE OF TEMPERATURE.

The influence of different temperatures upon the strength of steel and iron is not satisfactorily explained. With respect to ultimate resistance only, because of numerous experiments, has there been a growing accord of views. For most kinds of metal, especially for iron, the ultimate strength appears to increase with the decrease of temperature below zero, but also to reach a maximum at a little above 100° C. Within a certain interval near 16° the resistance is quite constant; the beginning and the rapidity of the increase and the position of the maximum are dependent upon the conditions already considered.

Fairbairn, in tension experiments with bar iron, found, in one case, the resistance at 0° equal to, in another, 1 per cent. higher than at 60°. Thurston found in torsion experiments a decided increase of strength to − 12°. Spence, in experiments in bending cast iron, found at − 18° a strength greater by about 3·5 per cent. than at +15°. At higher temperatures Fairbairn found for bolt iron the maximum of ultimate tensile strength at 163° 41 per cent. greater than at 18°; later experiments with bar iron put the maximum at 213°. A commission of the Franklin Institute, at Philadelphia, found the maximum strength 15 per cent. greater than its ordinary value at about 288°. Styffe has published the results of numerous experiments. See his table VII.

Beyond the maximum the ultimate resistance decreases at first slowly, but very rapidly at red heat. In this respect, too, the different kinds of metal behave very differently, and the diminution may possibly be the quicker and more rapid the lower the temperature of the metal when under mechanical treatment. Tensile resistance Fairbairn found to diminish from 202°, where it was about the same as at ordinary temperature, a low red heat, by about 17 per cent.; up to ordinary red heat, by about 34 per cent. Experiments at the Franklin Institute found the ultimate tensile resistance at 575° lowered by 0·06, and at 700° by 0·33 from the ordinary value. Bauschinger observed the strength of puddled plate, transverse to the direction of rolling, to be at red heat 780 kil. (2700 ordinary), and of rolled iron along the fibers, 50 (4430 ordinary).

These results are of importance with respect to constructions exposed to fire. Kirchweiger, of Hanover, regards the diminution of tensile strength by heating as the cause of boiler explosions; attempting to prove at the same time that a boiler filled with water may become red hot. Bauschinger thinks it possible that the continual variations and differences of temperature of the outer and inner surfaces may diminish the cohesion of the laminæ of the plate; the inner laminæ bearing a disproportionate share of the strain, and the shearing resistance being lessened.

A frequent theme of discussion is the influence of cold upon resistance to sudden changes of stress—shocks in particular. It cannot be denied that more axles and wheels break in winter than in summer. Styffe maintains that rupture is often due to the fact that the parts are held fast, and, therefore, cannot yield to the contracting influence of the cold; again, for tires, axles and rails, the effect of shocks is increased by the diminished elasticity of the ground.

Sandberg, in an appendix to the English translation of Styffe's work, maintains that these are not the principal causes of breaking. He laid iron rails upon granite supports which lay upon granite rocks, so that the elasticity of the foundations might be the same in any season. The two halves of these rails were tested by blows with a 380 kil. ball at − 12° in winter, and + 29° in summer; and it was found that at −12° the rail could withstand only $\frac{11}{20}$ of what it could at + 29°. This showed, at least, that there are some kinds of iron that are weakened by frost. Styffe had tested only under dead loads, and in this respect his results were trustworthy.

Sandberg also found this peculiar result: that Aberdare rails, which bore in summer 20 per cent. more strain than those from Creusot, in winter had 30 per cent. less strength. This could be explained on the hypothesis of a difference in constitution which affected the strength unequally. Fairbairn had already shown the unfavorable effect of phosphorus and sulphur at low temperature; and Sandberg thought it possible that different results would have been reached had the metal been free from phosphorus.

Unfortunately the chemical constitution of the rails was not determined; but it seems likely that phosphorus, which always diminishes resistance to shock, may operate more actively at a low temperature. Its effect also increases under high heat. Styffe found that the grain of a screw bolt of phosphor-iron was so affected that a single blow of the hammer broke it. Steel with increasing mixture of phosphorus, loses its capacity to undergo repeated heating without losing its peculiar properties.

In the year 1871, Joule, Fairbairn, Spence and Brockbank contributed to the Manchester Literary and Scientific Society four papers upon the influence of cold upon iron and steel. All agreed that resistance to dead load was not diminished by cold, but considerably increased. Brockbank held it certain that cold diminishes resistance to shock; this, Joule and Fairbairn did not admit. All referred to experiments. No one will question the exactness of Joule's tests; but the test pieces were wires, needles and nails, so that the results may not hold for larger pieces; while Fairbairn and Spence tested only under dead load. A series of observations by Brockbank confirm the results obtained by Sandberg. Rails were tested with blows; and in frosty weather they had far less strength than at ordinary temperature; a hollow cast iron core-rod, about which a cylinder had been cast, cooled down to −7½°, broke square and smooth, leaving a brittle looking surface, while the pieces were made stiff and sound again by heating. A rod of round iron of best quality, of 38 mm. diameter, which lay a week exposed to frost and was covered with ice, broke at 4½° under a single blow of a hammer weighing 5·4 kil.

All authorities admit the increase of resistance to tension under great cold, though they deny that there is a diminution of power to resist shocks. This is bad reasoning. It is certain that resistance to dead load is somewhat increased by frost; and beside this, according to Styffe, the elastic limit; just as is the case under hammering, rolling, hardening, etc.; but as with all the latter, resistance to shock increases, there seems to be no reason for a contrary judgment in the first case. Styffe has proved that iron becomes stiffer with decrease of temperature; agreeing with Sandberg.

Thurston concludes from results of his experiments that phosphorus and other substances, inducing cold brittleness, may impair resistance to shock at low temperatures, which seldom occur; and that in other cases resistance to dead load, as well as to shock, is increased by cold. This would be novel, but it must first be proved. Thurston's test machine is well adapted to the lecture room, being convenient and cheap; but it is not suitable for scientific experiments requiring results numerically exact. The velocity, an important element, is not regulated; the methods of measurement are much too primitive to answer to small differences due to temperature; and it is not to be taken for granted that torsion tests are best suited to determine the properties of resistance of fibrous and laminated metals.

In a report of the Massachusetts Railroad Commissioners (1874), mentioned by Thurston, it is said, that "cold does not make iron and steel brittle and unsuitable for mechanical purposes, and that it is not the invariable rule that the most breakings occur on the coldest days." The membership of the commission is not given, nor is it certain what kinds of metal were under consideration. Did it contain a large percentage of phosphorus? Were the rails iron or steel? It has been found in Northern climates—Canada, Sweden, and Russia—that a low steel, with ⅛ to ¼ per cent. phosphorus, was affected by cold much less than iron. According to Styffe there is no authentic case in which good steel contained more than 0·04 per cent. of phosphorus; though in one English iron rail there was 0·25 per cent., and in Dudley iron 0·35.

We draw the following conclusions from all the data to hand: (a). Iron and steel, which are entirely or nearly free from all foreign materials, have neither their resistance to dead load notably increased by cold, nor their resistance to shock diminished. (b). Certain elements not exactly determined, but phosphorus certainly, very much diminish resistance to shock and sudden change of stress. (c). The question cannot be definitely settled until the chemical constitution is determined. (d). Statistics of results in warm and cold latitudes in summer and winter, after long frost on days of sudden intensity of cold, are required.

The above has reference to the immediate influence of temperature. In regard to the effect of repeated changes of temperature, Wohler conjectures that frequent vibrations of molecules caused by heat, have the same effect in destroying cohesion as vibrations caused by external forces. Data from observation have not been obtained. Spangenberg after examination of the fracture surface, did not adopt this hypothesis. Bauschinger after testing boiler iron, thought it possible that the strength of the plate was weakened by long action of the fire. But this decides nothing as to the effect of repeated influences. If Wohler's hypothesis is correct, we should recognize in change of temperature a cause of destruction, not only of metals, but also of all other solid bodies. And safety coefficients would be of no avail, for if we should make one beam twice as large as another, each half of the first would be as much affected as the whole of the second. In any case, bridges and buildings which are subjected to only slight variations of temperature, will certainly be more likely to fail from other causes.

Prof. T. Sterry Hunt thinks well of the discoveries of petroleum in California. In San Buenaventura the result of refining gave 59 per cent. of burning oil that inflames at 130° fire test. The production is about 100 barrels per day, partly light green and partly heavy black oil. In San Fernando, wells have been sunk to 135, 180, 200, 280 and 440 feet, yielding an aggregate of 60 barrels per day. The crude oil has a density of 40° Beaume, and yields 60 per cent. burning and 25 per cent. lubricating oil. Dangerous naphthas and paraffine are both said to be absent. The hills are covered with "prospectors," who are busy "locating" every foot of government land suspected of containing oil. The refined oil sells for 50 cents a gallon.

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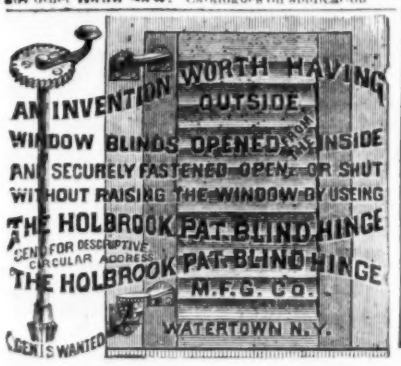

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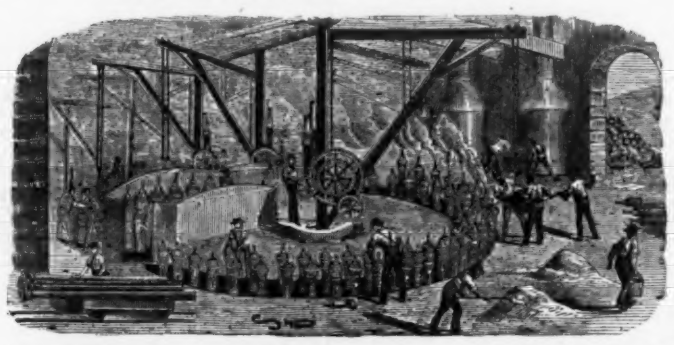

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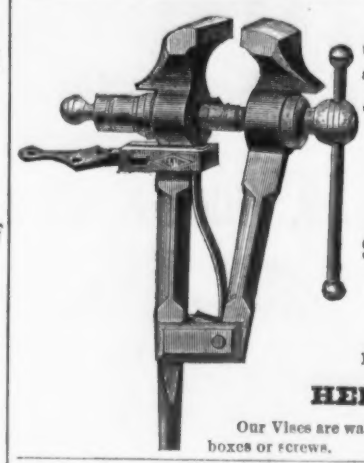

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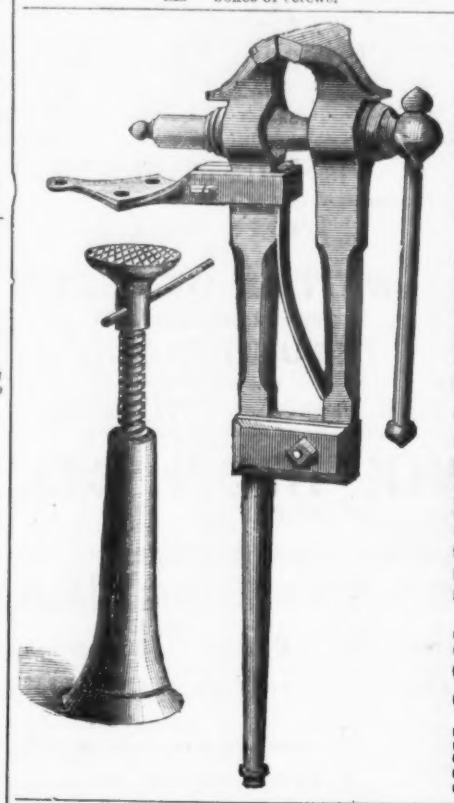

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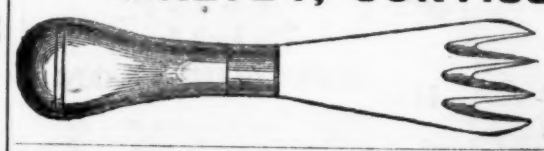

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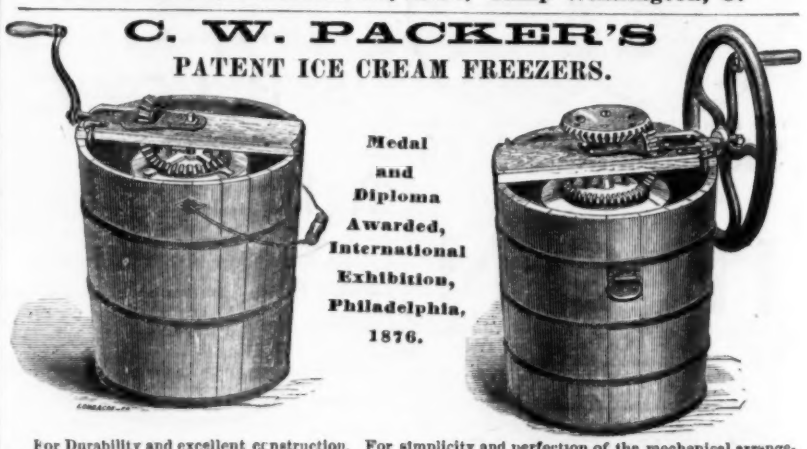

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For Durability and excellent construction. For simplicity and perfection of the mechanical arrangements by which cream, fruits, etc., are frozen. The novel construction of the dasher or beater having (self-adjusting) spring scraper, and deflectors, producing (in the process of freezing) the smoothness and richness requisite in good Ice Cream. The dashers being galvanized instead of tinned are unaffected by chemical acids, and leave no metallic taste in the cream. The facility with which the detachable-hinged cover is instantly removed, giving free access to the can. Their adaptation not only to family purposes, but for the use of confectioners, hotels, etc. For sale in New York at minimum rates by Wholesale Dealers in House Furnishing Goods generally.

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HARDWARE AT THE CENTENNIAL.

Report of the Judges of Group 15.

(Concluded.)

The following is a transcript of the official report of the Judges of Group 15, Centennial Exhibition, including hardware:

INTERNATIONAL EXHIBITION, 1876,
UNITED STATES CENTENNIAL COMMISSION,
BUREAU OF AWARDS, GROUP 15.
PHILADELPHIA, July 6, 1876.

Judges met at room at 9 o'clock a. m., and made the following report of examination for record:

The Brazilian exhibits consist principally of ornamental castings; the bolts, nuts and other wrought iron work are creditable to the exhibitors. Recommended for award of merit.

369. John Kaliokin & Sons, Nijni Novgorod, Russia. Table cutlery and a large variety of pocket cutlery, shears, pruning knives, &c.; highly finished, of excellent quality and tasteful designs. Recommended for award of merit.

370. Demetrius Kondratoff, Russia. Table, pocket and other cutlery; of common class, but of excellent quality, and moderate in price. Recommended for award of merit.

371. Alexis Zabialoff, Nijni Novgorod, Russia. Table cutlery, also pocket cutlery, shears, heavy pruning knives, &c.; very highly finished, of excellent quality and desirable patterns. Recommended for award of merit.

376. S. H. Quint & Co., Philadelphia, Pa. Stencils, pattern letters, &c.; a great variety of excellently well made articles. Recommended for award of merit.

PHILADELPHIA, July 10, 1876.

Judges met at room at 9 o'clock a. m. Awards, so far as forms were filled in, were signed by judges present, and various incidental matters of business were transacted, after which an adjournment was had until to-morrow, 11th instant, at 9 a. m.

PHILADELPHIA, July 13, 1876.

Judges met at room at 9 a. m. Several interviews were had with depositors in regard to their goods. There being no schedules of goods unexamined, judges were engaged in getting up reports and signing recommendations for awards. Adjourned to meet to-morrow, 14th inst., at 9 o'clock a. m.

PHILADELPHIA, July 14, 1876.

Judges met at room to prepare reports for awards, &c.; also inspected boxes said to be fire proof, deposited by F. W. B. Meidell, Copenhagen, Denmark; after which adjourned to meet Monday, 17th inst., at room at 9 a. m.

PHILADELPHIA, July 17, 1876.

Judges met at room at 9 o'clock a. m. Communication received from Mr. Wm. Graves, representing Herring & Co., asking judges to visit the factory of this firm and witness experiments in drilling welded steel and iron. After full consideration of the proposition, it was concluded to decline, insomuch as it was not intended the judges should make practical tests. The following exhibit was presented for examination:

384. Clough & Williamson, Newark, N. J. Wire, corkscrews and cork handles; strong, durable, well made and cheap. Recommended for award of merit.

Also a further examination of the exhibit of Mr. Edward H. Knight's patent angle corner compensating wrench, was made, Mr. Knight being present at room and fully explaining the merits of his invention.

After being recommended for award, judges adjourned to meet to-morrow at 9 a. m. at room.

PHILADELPHIA, July 18, 1876.

Judges met at room at 9 a. m. After transacting some preliminary business, proceeded to Agricultural Hall to inspect deposits of—

385. Wm. F. Palmer, San Francisco, Cal. Axes, hatchets, adzes, chisels, draw knives, coopers' tools, &c.; good, serviceable tools, substantially made; evidently not finished for special exhibition. Recommended for award of merit.

After signing reports of award and making additional examinations of safes, &c., judges adjourned to meet to-morrow at 9 a. m. at room.

PHILADELPHIA, July 19th, 1876.

Judges met at room at 9 o'clock a. m. Application of F. W. B. Meidell, manufacturer of Danish safes with fire proof wood and paper, that a test by fire be instituted with his safes, was received, and the chairman instructed to communicate to Mr. Meidell that the Group are not authorized, nor do they deem it their duty, to make the desired test. Judges proceeded to examine Yale's post office model and matters in regard to safes and safe locks; also, deposit of Baeder, Adamson & Co., sandpaper, emory paper and cloth. The subject of post office and safes and safe locks referred to in special report on safes and locks.

387. Baeder, Adamson & Co., Philadelphia, Pa. Sand paper, emory paper and emory cloth; handsomely made and of excellent quality of material and manufacture. Recommended for award of merit.

Adjourned to meet to-morrow, 20th inst., at room at 9 o'clock a. m.

PHILADELPHIA, July 20, 1876.

Judges met at room at 9 a. m., and had under consideration sundry "ticket" applications, without schedules or proper descriptions of claims of depositor; therefore deferred until further information be given. Mr. William Russell, of Cincinnati, O., manufacturer of horseshoes, waited upon the judges and explained some of the advantages claimed for his shoes. A special examination was undertaken by Gen. Imboden, by appointment with Mr. Russell. Reports of awards having been made out to date, it was determined to forward them to the Bureau of Awards, with the following communication addressed to Hon. Francis A. Walker, Chief of Bureau:

DEAR SIR: I have the honor to present herewith the "Report on Awards," being the result of the labors of Group 15 to date, excepting the items of safes and safe locks, in relation to which a special report will be shortly made. The practice of Group 15 has been to make examination in a congregated capacity, thus avoiding the necessity of a subdivision by which individual opinions are given; consequently in the reports herewith the individual name, for which a blank is provided, is omitted and the certification made by the whole group. In the phraseology of the award it has been esteemed best to employ short yet comprehensive terms, as being, under the circumstances, best adapted to the end in view. It was seldom possible, and in all probability not intended, that we should have a practical test of quality beyond that supplied by the judgment of an expert purchaser. This, it is believed, has been given with a single purpose to do simple justice to all interested.

Very respectfully, DANIEL STEINMETZ,
Chairman Group 15.

By request of the Chief of the Bureau, the blank space for the signatures of individual judges was afterward filled in by the judges of Group 15, each report, therefore, having a signing judge in addition to the approval of the Group judges. H. K. STEINMETZ,
Secretary Group 15.

Adjourned to meet at 5 p. m. to-morrow at room.

PHILADELPHIA, July 24, 1876.

Judges met at room, at 9 a. m., and after considering several applications in regard to exhibits, proceeded to determine the merits of the deposits of safes, safe locks, &c., which occupied the time until 5 p. m., when an adjournment was had to to-morrow, 25th inst., at 9 a. m. at room.

PHILADELPHIA, July 25, 1876.

Judges met at room and proceeded to further consider the exhibits of safes and locks, resulting in a final determination, as follows, viz.:

400. B. Haffner, Senior, Paris, France. Safes, jewel boxes, &c. A full and fine exhibit of fire and burglar-proof safes, house or plate safes, jewel boxes, &c., with combination locks and a time or chronometer lock. These safes, of which there are many specimens of different sizes, are exceedingly well made and fitted, and the same may be said of the locks. The burglar-proof safes are composed of alternate plates of wrought and hard cast iron and would offer great resistance to the drill. The fire-proof safes have combination locks and are filled with a non-conducting composition. The jewel cases and cash boxes are well made and finished. The plate safe is a model of taste in design and finish. Recommended for award of merit.

401. Chatwood, London, England. Fire and burglar-proof safes; well made and of good material. Recommended for award of merit.

404. Hall's Safe & Lock Co., Cincinnati, O. Safe deposit vaults, bankers', jewelers', office and house safes, and chronometric and other locks. Special claims are: For fire proofs: A patent prepared fire-resistant. For burglar proofs, that they are built of alternate plates of welded iron and chrome steel, fastened together by conical bolts; they have interlocking bolts, chronometric attachment to lock, dove-tailed corners and doors, detachable handles; additional protection for inside of doors in fire-proof work. All the above are esteemed valuable improvements. The style and workmanship throughout are of the highest character as to finish and security. The safe deposit vault is a strong and massive structure, equal to any exhibited, with its doors well protected by having bolt work and combination locks. Recommended for an award of merit.

406. Beard & Bro., St. Louis, Mo. Burglar and fire-proof safes with screw door. Special claim: Powder drill and wedge proof. The construction of this door affords a security which the square door does not. The safes are constructed of alternate plates of welded chrome steel and iron in the usual manner. The workmanship throughout is of excellent character. These safes have circular doors; are made of welded chrome steel and iron; doors are closed by a screw and the fit ground, as the door is admitted to be the weakest point in any safe. This circular form ground fit and secured fastening, may be regarded as additional security in comparison with the square or rectangular, single or double doors, and the screw securing the door being double threaded—one thread 1-16 pitch finer than the other—gives a close fit without much risk of jamming. These safes are worthy of notice for their burglar-proof qualities. Recommended for award of merit.

407. Herring & Co., New York. Fire and burglar-proof safes, bankers', office and house safes and jewel boxes, chronometer and other locks. Special claims: Patent filling for fire-proof work. For burglar-proof work: Franklinite in addition to welded steel and iron in construction; revolving bolts; doors and their openings tongued and grooved and packed with rubber; locks with or without chronometric attachment; detachable lever or stop securing the bolts in case the lock is forced. The time and safe locks are fine specimens of workmanship, and afford protection against fraud. The burglar-proof work very strong and massive, and every precaution taken against fraud or violence. The office and house safes very thoroughly made and decorated. The whole exhibit showing good taste and first-class workmanship. Recommended for award of merit.

408. Terwilliger & Co., New York. Fire and burglar-proof safes. Special claims: Burglar-proof safes; welded steel (the outer plate of steel) and iron revolving bolts; door tongued and grooved, and packed with rubber or felt. The fire-proof safes filled with the ordinary composite filling; well constructed, substantially made and of superior finish. Recommended for award of merit.

409. J. Watson & Son, Philadelphia, Pa. Bankers,' office and house safes. Special claims: Welded steel and iron; tongued and grooved doors, and revolving bolts for burglar-proof work. Fire-proof safes filled with the ordinary composition. The safes in this exhibit are well made and finished. Recommended for award of merit.

412. Marvin Safe & Scale Co., New York. Fire and burglar-proof safes, bankers', office and house safes, jewel boxes and combination locks. The burglar-proofs of welded steel and iron, and of the same general construction and arrangement of bolt work as many others, and is strong, well finished work. The fire-proof safes are filled with a fire-proof composition, and are well finished and decorated. The safe locks are good and very low in price. The house safes are very tastefully finished. There is also a spherical safe made of chrome iron, and stated to be drill proof. Recommended for award of merit.

413. Farrell & Co., Philadelphia, Pa. Safe deposit vault, bankers', office, jewelers' safes, &c. The burglar-proof made of welded steel and iron and Franklinite; very strong and massive, with revolving bolts, &c. The security of the safe consists in its three walls of an aggregate thickness of 9 inches, each door secured by a combination lock. The outside one has a double chronometric lock. The safe deposit vault is fitted up complete, and forms altogether the most extensive exhibit in the safe department. The fire-proof safes are well made and finished with combination lock, and are filled with concrete. Special commendation is given to the double fire-proof safe, which is presumed to be in every respect what its name indicates. Recommended for award of merit.

414. Safes and Safe Locks. Corliss Safe Company, Providence, R. I. Burglar-proof safes. This is a novel idea in safe making, and intended to be burglar-proof only. The outer shell is something more than hemispherical in form, of very strong iron of great thickness (5 inches), cast in a chill. The inner portion is concentric with the outer and hung in a crane on pivots, having a motion on its center, and horizontally, by which it can be turned to give access to its contents, or reversed and brought forward by appropriate mechanism to position for locking, when the junction between the two portions is made tight by a ground fit, leaving no chance of introducing any explosive or wedge, and is still further secured by an expanding packing ring or tongue, fitting into a corresponding groove in the outer shell. The lock is also exceedingly well protected against assault, being encased in a heavy burglar proof box attached to the inside of the safe. The metal of which the safe is composed is sufficiently thick and well chilled to be presumably able to resist a burglar during such period of time as he would probably have to operate upon it. Should the lock be forced off, communication is still impossible with the interior of the safe. This safe is radically different in construction and operation from those made for some years past, and offers security from violence which entitles it to the highest commendation. Recommended for award of merit.

414½. Valentine & Butler, New York. One fire-proof and one burglar-proof safe. First-class work; well and strongly made, provided with the usual protection against fire and burglary. Claim: Offset, spindle, door and recess corners. Recommended for award of merit.

415. Sargent & Greenleaf, New York. Combination time and other locks. The time locks are simple and effective, and are an absolute lock-out to every one until the expiration of the time for which they are set. Their winding is accomplished by the act of setting the mechanism to the hour for unlocking. The combination and other locks are well and strongly made, and finely finished. Recommended for award of merit.

416. New Britain Safe Lock Company, New Britain, Conn. Bank safe, safe deposit, drawer and other locks. This is a large exhibit, comprising the Isham key register, Pillard dial and time locks, and locks for other purposes. The bank and time locks are fine specimens of workmanship; the other locks are very well made and finely finished. Recommended for award of merit.

417. Yale Lock Manufacturing Co., Stamford, Conn. Time, safe deposit, prison, door, closet, drawer locks, post office boxes and locks, door trimmings, hinges, &c. These are well made, substantial goods. The better grades are very finely finished and all well adapted to their intended purposes. The model post office, together with the boxes and locks, is neat and tasteful in design, and a public convenience. The time locks are very fine specimens of workmanship, and possess every element of security and protection against being opened except at the stipulated time and by the proper person. The door knobs, handles, trimmings, &c., are fine, well made goods. Recommended for award of merit.

Adjourned to 9 o'clock a. m. to-morrow (Wednesday), 26th inst., at room.

PHILADELPHIA, July 26, 1876.

Judges met at room to prepare recommendations for award for safes and safe locks, which, on being completed, were by arrangement to be forwarded to-morrow, 27th inst., to Chief of Bureau of Awards. Judges adjourned until to-morrow to meet at room for this purpose.

JUDGES HALL,
PHILADELPHIA, July 27, 1876.

The members of Group 15 having at this date completed the object for which they were appointed by the Centennial Commission, unanimously desire to tender to their chairman, Daniel Steinmetz, Esq., their sincere acknowledgements for the able manner in which he has discharged the difficult duties of his office; for his constant attendance and ready attention to the consideration of the varied claims presented, and especially for the uniform courtesy and kindness shown to every member during the arduous and often difficult period of their labors. The subscribers express an earnest hope that their Chairman may be spared with his family in comfort and happiness for years in his retirement from business, and enjoy the leisure so justly earned by a successful career in business.

DAVID MCHARDY, Crawford, Aberdeen, Scot.,
JAS. BAIN, Lord Provost, Glasgow, Scotland,
CHAS. STAPLES, Portland, Maine,
G. L. REED, Clearfield, Pa.,
JOHN D. IMBODEN, Richmond, Va.

PHILADELPHIA, July 28, 1876.

The members of Group 15, having had under consideration the suggestion of Gen. Walker that one of their number should be appointed to give such explanations as may be afterward required by the Centennial Commission, held a meeting this day and unanimously resolved to appoint their chairman, Daniel Steinmetz, Esq., to represent the Group for that purpose, and the chairman, being present, agreed to accept the appointment. The clerk was instructed to send a copy of this appointment to General Walker.

Adjourned finally this day as a group, subject to above resolutions.

H. K. STEINMETZ, Secretary.

In May last the Fall River manufacturers sent Mr. S. A. Wheelwright, formerly a consul in South America, to Brazil, to study the exact requirements of that market for cotton goods. The mission was a successful one in every particular. The information obtained gave the manufacturers a clew to what it was necessary to do to adapt their goods to the tastes of the Brazilians, and Mr. Wheelwright, by establishing agencies in the several provinces, provided the means for selling the goods after they were sent there. The result is a larger and increasing sale of American cottons in Brazil. There is apparently nothing to prevent the sale doubling once a year for years except a relaxation of effort. Mr. Wheelwright reports that there is great need of having houses in Brazil who will work for American merchants. The few houses now engaged in the American trade are mostly interested in exporting tropical products, not in importing.

USE THE BEST.

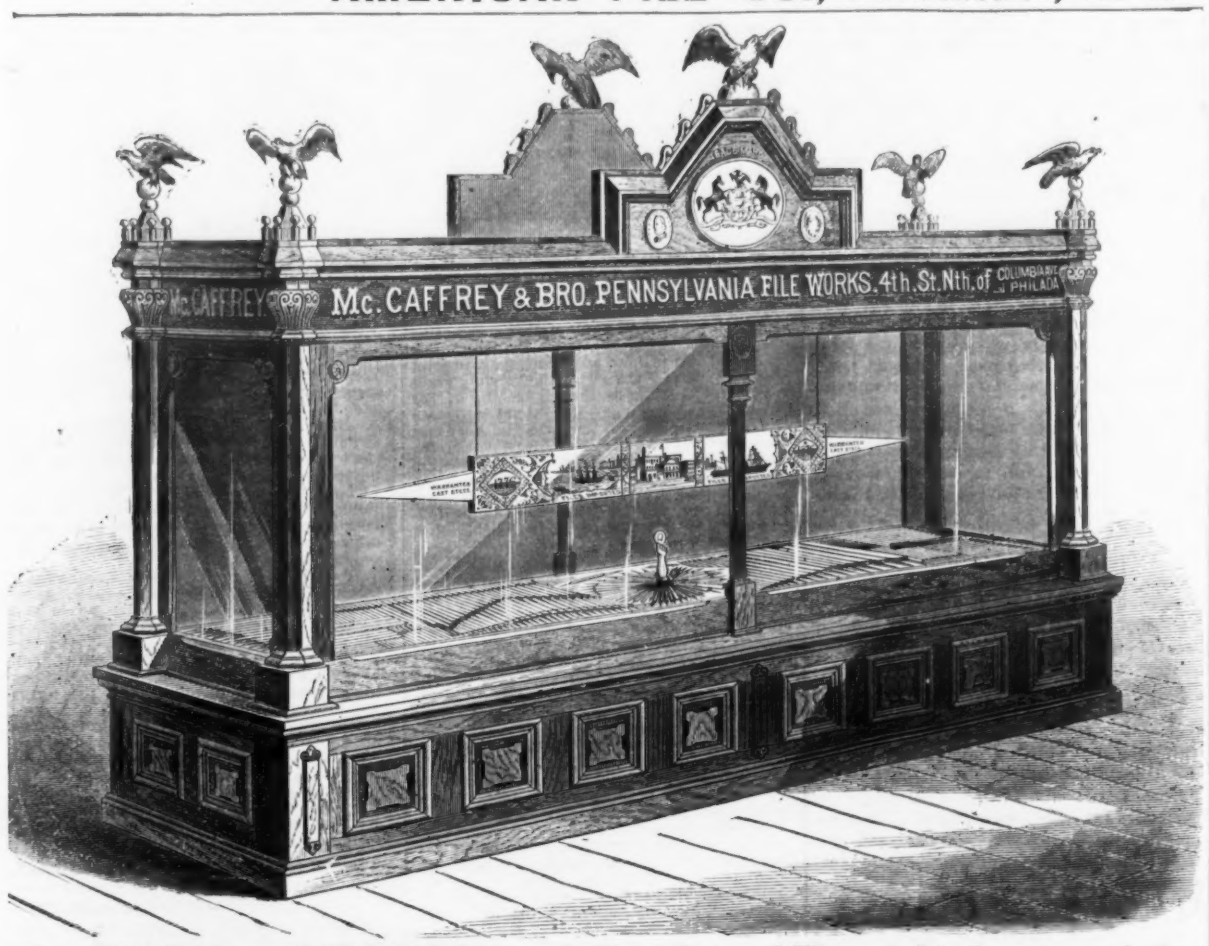
Pawtucket, R. I.

The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

AMERICAN FILE CO., Pawtucket, R. I.



These **FILES and RASPS** are all Hand Cut and Warranted to do more work than any other brand in the market.

AUBURN FILE WORKS,

Superior Hand-Cut

FILES AND RASPS,

MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.

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ESTABLISHED 1848.

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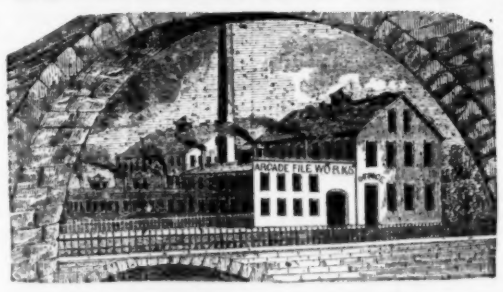
Sing Sing, N. Y.
Manufacturers of SUPERIOR
HAND CUT



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Made from Best
ENGLISH CAST STEEL.
Quality guaranteed by written warranty when required.

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PICTURE AND SHUTTER KNOBS.

COLORS: Jet, Tortoise Shell, Rosewood, Scarlet, Blue, &c

Send for price list with discounts. Enameling on wood or metal in colors to order.

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GOLD MEDAL

Non-Extensible Razor Belt.

PATENTED JULY 25, 1871.

RE-ISSUED MAY 13, 1873, and JUNE 9, 1874.

In this Strap the liability of the leather to stretch and become loose and porous is prevented by the use of a patented non-extensible base, which supports the leather and secures

PERMANENT ELASTICITY.

We make this strap with single rod, double rod, and wood frames, and intend that it shall, in quality compare favorably with our other well known brands.

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HELLER BROS. T M NEWARK, N.J.

We invite the attention of the trade to our **Celebrated American Horse Rasps and Files**, made from the very best American Steel all cut by hand, and warranted to give entire satisfaction. All Rasps not stamped as the annexed incorporated trade mark are not genuine. Sold by Hardware dealers generally.

Established 1858.

FILES & RASPS,

Best Cast Steel.

HAND-CUT. Manufactured by

JOHNSON & BRO.

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Established 1835. TRADE MARK ON

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New Pattern

Horse Rasps,

John Rothery's

HAND-CUT FILES and RASPS,

Made from English Cast Steel.

JOHN & WILLIAM ROTHERY,

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Putnam's Government Standard

FORGED

Hammer Pointed

HORSE SHOE NAILS,

READY FOR DRIVING.

Manufactured from the best of **NORWAY** Iron, and warranted to give entire satisfaction.

S. S. PUTNAM & CO.,

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Particular attention paid to **Model Making.**

Gear cutting for CLOCK WORKS, &c., a specialty.

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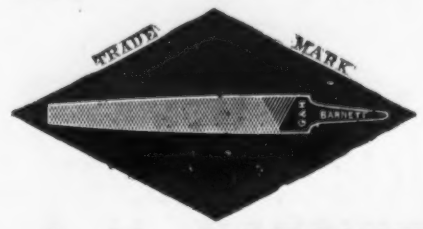

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THOS. TAYLOR, 43 Chambers St., N. Y., Agent for N. Y. and N. E. States.

THOS. JOWITT & SONS, SHEFFIELD,

Manufacturers of every description of

FILES.

Forged, Ground and Cut by Hand and Tempered by an Improved Process.

Manufacturers of

CAST, SHEAR & BLISTER

STEEL

For various purposes.

CORPORATE MARK TESTED

ROLLERS, TILTERS & FORGERS.

Importers of

SWEDISH and RUSSIAN

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Messrs. Quackenbush, Townsend & Co *New York.*
Messrs. Huntington, Hopkins & Co., *San Francisco and Sacramento.*
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NO CONNECTION WITH ANY OTHER HOUSE.

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AGENTS for the American Screw Co.'s Machine Screws and Taps.
SOLE AGENTS Thos. Turner & Co.'s, Files, Horse Rasps.
" " Hubert's French Emery Paper.
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CHARLES B. PAUL,

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Warranted CAST STEEL. 187 Tenth Street, Williamsburgh, New York.
All descriptions of Files made to order. Price List mailed on application. Established 1863.

AUSABLE HORSE NAILS

POLISHED OR BLUED.

HAMMERED AND FINISHED

The Ausable Nails

Are Hammered Hot,

And the Finishing and Pointing are Done Cold,

Thus Imitating the Process of Making Nails by Hand.

Quality is **Fully Guaranteed.**

For Sale by all Leading Iron and Hardware Houses.

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Manufacturers of

AXES

Of all kinds.

Hatchets, Adzes, Grub Hoes, Mattocks and Picks.

Catalogues and Price Lists furnished upon application.

INDUSTRIAL ITEMS.

MASSACHUSETTS.

The European war has now given some business to Worcester for the first time, the Wood & Light Machine Company having received an order for 40 lathes for gunwork, with a prospect of more.

Loring's tack manufactory, at Plymouth, which has stopped business, will probably not resume this summer.

CONNECTICUT.

The Peck, Stowe & Wilcox Company, of Southington, are building a large brick addition to their shop for the manufacture of Norway iron bolts.

An order for steel was sent to a Sheffield, England, firm by cable from Bridgeport, the steel manufactured and delivered in Bridgeport in 12 days.

Clark & Cowles' Hardware Manufactory was burned in Plainville, Friday night, the 18th, causing a loss of $25,000. Insured for $8600.

Norwich manufactures over 14,000 revolvers a month.

The Collins Company, of Hartford, have been awarded the government contract for the supply of axes for the Indians this year.

NEW YORK.

Work was resumed in the Star Mill and Steam Forge, owned by Corning & Co., in the lower part of Troy, on Monday night, the 21st.

A special train of eighty-three new freight and coal cars passed up over the Delaware and Hudson Canal Company's railroads on Saturday. They belonged to the Cold Brook Rolling Mill Company, of the Dominion of Canada—a new institution just commencing operations on the Ottawa River—and were built at the Gardner Car Works, at Carlisle, Pa. Gilbert, Bush & Co., of Green Island, Troy, are building several new coaches and baggage cars for this company.

Witherbee, Sherman & Co., of Port Henry, have adopted the method in use in the Pittsburgh blast furnaces for the removal of slag from their stacks. It is accomplished by a revolving receptacle into which the molten slag is run, and is then carried by a crane under a hydrant, from which it is deluged with water, reducing it to a sand-like substance, and is thus cooled and rendered easy of removal.

The Bay State Iron Company, at Port Henry, resumed operations with one furnace stack Monday, the 21st. They obtain magnetic ore from the Barton and Cheever beds, near Port Henry, and hematite ore from Ulster and St. Lawrence counties. Their blast furnace when in full operation, gives work to 200 men.

NEW JERSEY.

The Port Oram Furnace is making a 20 per cent. spiegel from a mixture of Chester ore and manganese.

PENNSYLVANIA.

The article copied by us last week from the Reading *Eagle*, in regard to Seyfert, McManus & Co., we find upon inquiry is not in accordance with facts. We learn from the company that their employes have been paid a month's wages regularly every month this year, including the present month, and that they have no knowledge of any strike or the probability of one.

In three days, week before last, the Bethlehem Iron Company shipped 155 cars of steel rails.

A gas producer at the Chester Rolling Mills exploded on the evening of the 19th inst., causing damage to the extent of $7000 and seriously injuring two men.

During the month of April, Messrs. E. & G. Brooke, of Birdsboro', manufactured 14,173 kegs of anchor brand nails, and shipped 17,047 kegs, being the largest number of nails ever shipped from their works in one month.

The rolls in the heating mill, at Birdsboro', used for rolling nail plate, being insufficient to roll fine iron any longer at the factory, have been taken out, and a new set substituted.

The Lancaster *New Era* says: All the mines along the Welsh Mountain, in Carnarvon township, are now strongly worked. About 150 tons of ore are daily taken out. They give employment to over 100 men. Shirk's mine ships 27 tons a day by teams to Souanna Station; Brook's, of Birdsboro', 40 tons by rail, and Seyfert & McManus, of Reading, will ship the same quantity as soon as their siding is finished.

The Harrisburg *Patriot* says that four tubular iron tanks per day are turned out of the shops of the Harrisburg Foundry and Machine Company, East Harrisburg. There are about 175 hands at work. In some of the departments, work is carried on day and night. About 100 tanks have been turned out, and the same number are yet to be constructed.

The old firm of C. Curtin & Co. have retired from the management of the Eagle Iron Works, Bellefonte, and the boys—Austin, Andrew G., Jr., James B. and Harry—have stepped into their places, under the firm name of Curtin & Co.

The iron works in South Harrisburg are working steadily, employing hundreds of hands.

At Robesonia one furnace is in blast; at Sheridan is another, and a second one about being put to work. In Reading there are four in blast, two of the Keystone Furnace Company, one of the Messrs. Eckert, and one of Seyfert, McManus & Co. Two are in blast in Birdsboro, one at Monocacy, two at Pottstown, and along the East Penn things are as last reported—not all running their full capacities.

Three Whitwell stoves are being erected at Catasauqua.

The blast furnaces at Westerman's, Sharon, are both in blast and doing well.

The Keel Ridge and Stewart furnaces are running steadily.

The salamander is out of the Shenango Furnace No. 1, and workmen are repairing her up as fast as possible. It is not the intention to take out the old lining; just patch it up and put in a new hearth and boshes. If the iron trade revives, it is said to be their intention to tear down the two old stacks and put up one 80 foot furnace in their stead that would give almost four times the producing capacity of the two furnaces there now.

The Vinton Iron Company's Slag Furnace is working smoothly, making a general average of 11 tons per day of good mill iron.

Orders have been received at the P. & R. machine shops, in Reading, for the construction of two new and large freight engines, ten-wheelers, to be finished as soon as possible.

The Reading Steam Forge, belonging to the Reading Railroad Company, is full up with work, and a double set of hands are employed.

The old furnace at Sheridan was to have blown in last week.

The Pennsylvania Furnace, at Huntingdon, has extinguished its fires, and will remain idle most of the summer.

The yield of Bessemer pig iron at the Centennial Furnace, of the Cambria Iron Works, week before last, was 578 tons. The stack is 75 feet high and 20 feet wide at the boshes.

The Paxton Rolling Mill, in South Harrisburg, has been running to its full capacity and working about 175 men for several weeks past. Much of the plate iron is sent to Roach's shipyards, at Chester. The iron for the Saratoga, recently launched, was rolled at the Paxton Mill.

The Pottstown Iron Company have been making tack iron for a Boston firm.

Joanna Furnace is running in full blast since Monday, the 14th.

The Millerstown Furnace is turning out a No. 1 quality of iron.

The workmen in the hydraulic shops of the Phœnix Iron Company, on Thursday were notified that their wages would be reduced from 15 to 18 per cent.

PITTSBURGH AND VICINITY.

Messrs. J. A. Sampsell and F. W. McLean have formed a copartnership and become successors to H. Straub in the hardware and cutlery business, at the old stand, No. 53 Federal street, Allegheny City. They are also manufacturers' agents for articles pertaining to the hardware trade. They are putting in a new and complete stock of goods.

Messrs. Kelly & Jones, manufacturers of steam heating apparatus, have removed to their new store, No. 141 First avenue, their business having so increased during the past year as to demand larger facilities. They are quite busy at this time, and expect to do a fair business this year.

The Edgar Thomson Steel Works prove their capacity to be about double what was estimated when they were built. The total product from January 1 to May 24, 1877, was as follows: 2,300 tons steel rails and 962 tons billets. At this rate the year's product will show nearly 60,000 tons of finished rails.

The new pipe mill, of Spang, Chalfant & Co., at Ætna, is working very successfully.

On Tuesday night, the 22d, the white lead works of Davis, Chambers & Co., Southside, Pittsburgh, were destroyed by fire, entailing a loss of about $100,000.

There is one spike manufactory in Pittsburgh, S. Severence, running about four-fifths capacity on small railroad spikes and boat spikes. It has run full time since January 1. There are three on the Southside—Jones & Laughlin, Dilworth, Porter & Co., and J. R. Taggart. The two first are running about full capacity.

The firm of Kloman, Park & Co. has been dissolved, D. E. Park and M. S. Davis having purchased the entire interest of the former partners. D. E. Park, M. S. Davis and Edward Maxwell will continue the business under the old style.

OHIO.

At midnight of the 26th, a fire broke out in the Youngstown Rolling Mill, at Youngstown, completely consuming the whole mill. Three hundred men are thrown out of employment. The mill cost $100,000, and was insured for $83,000. The fire was caused by the explosion of an oil can. The regular mill machinery and some very valuable machinery for the manufacture of cotton ties were all more or less injured. Quite a large amount of manufactured iron was destroyed.

C. Aultman & Co., Canton, manufacturing reapers, mowers, thrashers and farm engines, have immense works, covering some twenty acres of ground, employing $1,500,000 capital, and over 500 men. Some idea of the magnitude of their operations may be gathered from the following items of material which enters into their manufacture annually: 3000 tons pig iron, 1500 tons wrought iron, 50 tons steel, 1,500,000 feet of lumber, and an enormous amount of other material.

Ballard, Fast & Co., Canton, employ 150 men in the manufacture of steel springs, saws, reaper and mower knives and sections.

Two thousand eight hundred men are now in the employ of the Cleveland Rolling Mill Company.

At Youngstown, No. 2 Himrod Furnace was blown in Wednesday, the 16th. No. 3 Himrod will remain idle until it is rebuilt or repaired. When it is repaired the company intend to make it correspond in hight with the others, by raising it from 45 to 75 feet. No. 1 Himrod has been running for nearly two years past. It is now doing well, yielding about 50 tons of No. 1 iron daily. The Phœnix Furnace is doing well, making from 48 to 50 tons of No. 1 iron daily. Of the 12 furnaces 8 are in blast and doing well. The idle ones are one of Andrews Bros., at Hazelton, one of Himrod's and two of Tod's, at Brier Hill.

The Buckhorn and Howard furnaces are running on stonecoal, and are making superior iron, better than ever.

It is again rumored that the Hubbard Mill will start soon.

[*Continued on page* 11.]

[*Continued from page* 9.]

INDUSTRIAL ITEMS.

OHIO.

At Hanging Rock, Martin, Henderson & Co. are doing a good business this spring in the stove manufactory, and it is rumored that a company from Pittsburgh, Pa., are making arrangements to start the Excelsior Stove Foundry.

All the mills at Ironton are running.

The Youngstown *Register* says: So far as production is concerned, the furnaces of the Mahoning and Shenango valleys not only held their own in 1876, but showed an increase over their production of 1875. In 1875 the production in the Shenango Valley was 137,025, and the product of the Mahoning Valley, 115,993 tons; total, 253,018 tons. In 1876 the product of the Shenango Valley is estimated to have been 150,000 tons, and the product of the Mahoning Valley 134,000 tons; total, 284,000 tons. This gives the Shenango Valley an increase of 12,975 tons, and the Mahoning Valley an increase of 18,007 tons; total increase for the two valleys, 30,982 tons. The total capacity of the two sections is 581,000 tons. Of 32 stacks in the Shenango Valley, 8 are in blast, and of 22 in the Mahoning Valley, 11 are in blast.

MICHIGAN.

The following table exhibits the shipments of iron ore from the port of Marquette for the season, up to and including Wednesday, May 16:

Name of mine.	IRON ORE.	Gross tons.
Republic		6,920
Cleveland		4,222
Lake Superior		3,544
Edwards		457
Rolling Mill		1,306
Carp River Quartz		125
Humboldt		798
New York		280
Total		17,652
Name of furnace.	PIG IRON.	Gross tons.
Pioneer		70

The following table shows the ore shipments from Escanaba up to and including Thursday, May 17:

Jackson	5,152
New York	3,377
Angeline	2,080
Barnum	3,508
Saginaw	4,310
Michigamme	496
Lake Superior	1,379
Cambria	1,255
Salisbury	2,252
Quartz	95
Total	23,814

—*Mining Journal.*

INDIANA.

The rail mill at New Albany is running.

Furnace No. 3 of Star Glass Works, New Albany, is working.

American Representation at the Paris Exhibition.—We are pleased to learn that Messrs. C. W. May, Firnhaber & Co., No. 50 Boulevard Haussman, Paris, represented in this country by Mr. A. W. Morton, No. 23 Platt street, N. Y., are arranging to take charge of and exhibit at the Paris Exposition next year American manufactures suitable for the Continental markets. Messrs. May, Firnhaber & Co. have long been extensively and successfully engaged in the exportation of French goods to America, and have connections with all parts of Europe. After careful investigation they are satisfied that the course of profitable trade is now tending in the other direction, and that there is a large and profitable market for American manufactures in Europe. Hereafter the facilities of their house will be employed in building up an export of American manufactures to France and other countries of Northern Europe. Their offer to secure space for and undertake the sale of American goods at the French Exhibition next year, is one of which our manufacturers would do well to take advantage.

Work on the Brooklyn Bridge.—The wire for the cables of the Brooklyn bridge was taken to the top of the tower on the Brooklyn side last week. The elevating process is accomplished by means of drums or windlasses. Of these there are 32, each cable requiring eight. Each drum holds 60,000 feet of wire, which is covered with two coatings of oil, and, after being dried, is transferred from a small drum on the top of the pier to a larger one. A coupling of metal joins each coil every 1000 feet. The strength at the point where the coils are joined is increased by the application of a powerful screw. A circular iron staircase is to be substituted for the present perilous wooden staircase. It will consist of 12 stages, each of 15 steps, and will reach half way up the tower. It has been feared that the wooded scaffolding might be fired, as there is a large quantity of timber and coal not far distant.

Japan is one of the natural markets for the products and wares of the United States. Of the civilized industrial nations of the world the United States is the nearest. She is only 6000 miles distant, while England is 12,000, and other industrial European countries are from 9000 to 11,000. The United States has the advantage also of two lines of steamers to Japan, so that there is no bar to trade for lack of direct steam transportation, as there is in the case of South America. Nevertheless, look at the position of the United States in the trade of the empire. Of the exports of Japan we take only 17 per cent., and of her imports we furnish only 4 per cent. England, 6000 miles further away, takes 35 per cent. of the exports, and supplies 62 per cent. of the imports. The English have scrutinized the market of Japan closely, and have sent there the things that can be sold. They have made a thorough and sustained effort to capture the market, and have succeeded. The Americans in their free and easy style are waiting for the Japanese to come here as buyers. They will never come. And that is not the way a trade is secured.

AMERICAN BOLT & NUT WORKS, Cincinnati.

L. M. DAYTON,

MILL, Anchor Iron & Steel Works, Newport, Ky.

CINCINNATI, O.

Bar Iron, Carriage Bolts, Plow Bolts,
Sheet Iron, Tire Bolts, Hot Pressed Nuts,
Horse Shoe Iron, Machine Bolts, Washers.

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CLARK BROTHERS & CO.,

SOLE MANUFACTURERS OF

Clark's Patent Concave Carriage Bolt.

Best Bolt manufactured for all kinds of Agricultural Machinery. Will not split the wood, and cannot turn in its place.

ALSO MANUFACTURERS OF

TIRE, PLOW, MACHINE BOLTS,

COACH SCREWS, NUTS, WASHERS, RIVETS, Etc.

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EAGLE BOLT WORKS.

(ESTABLISHED 1845.)

The Original and Only Establishment Manufacturing the

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Made of Best Quality

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Successors to M. J. COLEMAN.

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WROUGHT IRON HARDWARE SPECIALTIES FOR WAGONS,

And all kinds of CARRIAGE AND WAGON MALLEABLES.

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The Best and Cheapest in the market. Send for Catalogue. Correspondence solicited.

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Successor to W. C. BARKER & CO.,

Iron, Steel, Nails,

HEAVY HARDWARE, WAGON AND CARRIAGE MATERIAL, DRILLS, ANVILS, BELLOWS, VISES, CHAINS, &c.

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☞ WARRANTED. ☜

The Double Screw Parallel "Leg" Vise

Stronger than any other, whether of Foreign or of American make; always parallel and holding with a tighter "grip." The jaws are of convenient shape for the workman to get near his work equally well for filing or chipping, instead of the heavy, clumsily formed jaws of the cast iron Single Screw Vises of the common "parallel" type.

Our Vise combines all the advantages of the "Peter Wright" Leg Vise, of strength and lightness, fastening to the floor and bench, and at the same time greatly superior to it; is always perfectly parallel at all points of opening, and never gets out of line. *We now warrant these Vises for three years from date of manufacture* stamped upon each.

The Jaws are of best Tool Cast Steel, welded on, file cut and properly hardened. The screws are forged of the best refined iron, and work in *solid cut thread* boxes. The lower screw maintains the parallel position of the two jaws, by having exact motion with the upper working screw through the connecting chain which regulates it. The chain has no strain on the work upon it, and is therefore as durable as all the other parts.

REDUCED PRICE LIST.

No. 1, Jaws 3⅛ in. x ⅞ in., Screws ⅝ in. diameter, Lever 9 in. long, opens 4¼ in. $7 00
No. 2, Jaws 4⅛ in. x 1 in., Screws ⅞ in. diameter, Lever 13 in. long, opens 5⅛ in. 11 00
No. 3, Jaws 5⅛ in. x 1¼ in., Screws 1⅛ in. diameter, Lever 16 in. long, opens 6¼ in. 16 00
No. 4, Jaws 6¼ in. x 1¼ in., Screws 1⅛ in. diameter, Lever 19 in. long, opens 7½ in. 20 00
No. 5, Jaws 7 in. x 1⅜ in., Screws 1⅜ in. diameter, Lever 24 in. long opens 9 in. 27 00
No. 6, Jaws 8 in. x 1½ in., Screws 1⅜ in. diameter, Lever 26 in. long, opens 10 in 30 00

All sizes of these Vises furnished with Swivel Attachment at same price.

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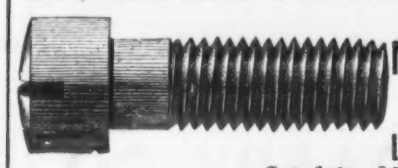

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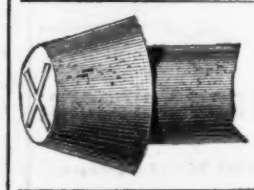

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MANUFACTURER OF

Boiler Rivets, Bolts, Railroad and Boat Spikes, &c.

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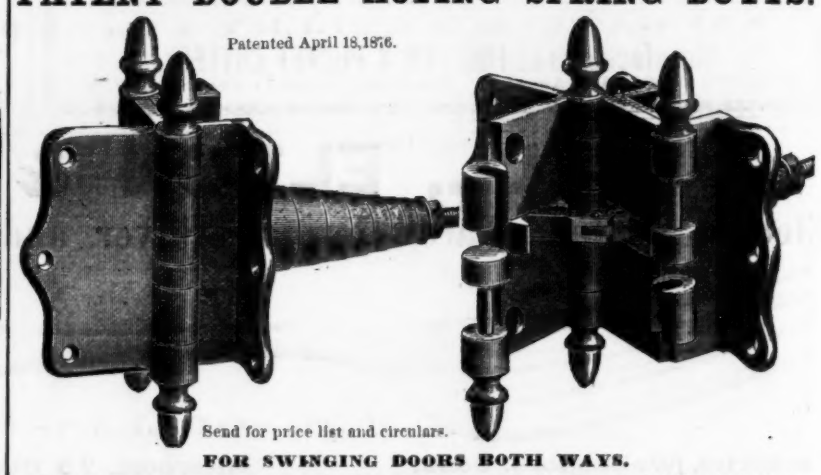
PATENT DOUBLE ACTING SPRING BUTTS.

Patented April 18, 1876.



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These Butts are the first ever constructed with two leaves only, and with flanges attached thereto for fastening to the door and casing, thus rendering them much more substantial and easy to put on, as the screws are all driven from the outside. By means of the flanges the door is hung firmly to the casing, instead of to a strip *as is the case with all other double acting Butts*, and the screws do not become loose, as the strain on them is much less. On the back of the Butt is a powerful volute spring, and draws in *direct line* with the center of the door, thus holding the door firmly in position, and *obviating all sag*. Our price list is from 25 to 40 per cent. lower than others. Manufactured by

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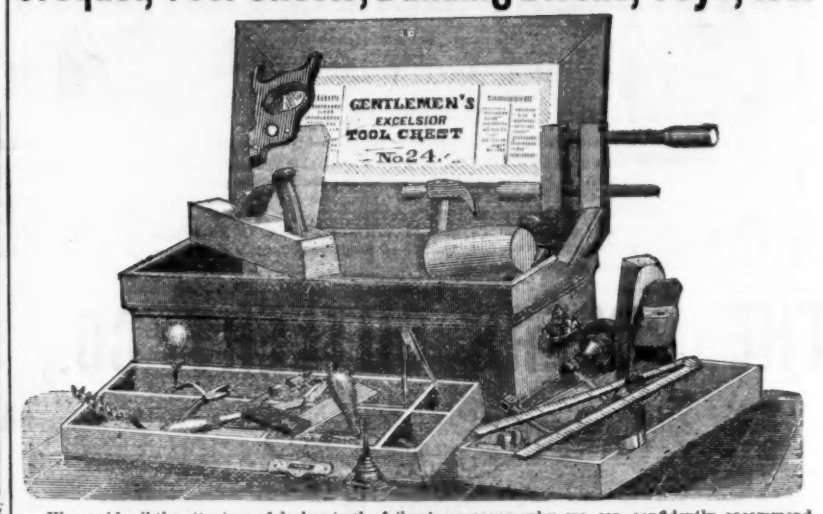

We would call the attention of dealers to the following reasons why we can confidently recommend our chests as **SUPERIOR** to any yet offered to the trade:

FIRST.—They are not filled with a lot of worthless Tools such as the cheap Hoop Iron Planes and Cast Iron Chisels commonly used, but all our Plane Irons, Chisels, Knives, Awls, &c., are warranted all steel. SECOND.—Our Boys' and Youths' Chests are not the cheap nailed Boxes commonly used for this purpose, but are made from fine Brown Ash, with Locked Corners, trimmed with Black Walnut Mountings, oiled and varnished.

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The Iron Age.

New York, Thursday, May 31, 1877.

DAVID WILLIAMS - - *Publisher and Proprietor.*
JAMES C. BAYLES - - *Editor.*
JOHN S. KING - - *Business Manager.*

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THOS. HOBSON, Manager.

BRITISH AGENCY.

The publishers of *The Ironmonger*, 44a Cannon Street, London, England, will receive orders for subscriptions and advertisements on our regular terms.

AUSTRALIAN AGENCY.

The American Hardware Company are our agents for Australia. They will exhibit files of *The Iron Age* in the American Building of the International Exhibition, at Sidney, N. S. W., where subscriptions will be received. After the close of the Exhibition, the files may be examined at, and orders for subscription directed to, their office in Melbourne. Sample copies will be mailed by them, free of charge, to any firm engaged in the trades we represent in Australia, Tasmania and New Zealand.

City subscribers will confer a favor upon the Publisher by reporting at this office any delinquency on the part of carriers in delivering *The Iron Age;* also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

CONTENTS.

The Conditions of Business Success.

The statistical reports of the mercantile agencies show that, of the whole number of individuals and firms in business, a somewhat larger percentage fail now than failed 20 to 30 years ago. Experience seems to show that it is more difficult to succeed in business now than in the days when our fathers began to lay the foundations of their fortunes. The statistics we can accept with confidence, as they are probably as accurate, both as to the number of those who fail and the amount of their liabilities, as any statistics can possibly be made. It is well, however, to take what seem to be the showings of experience with some caution. When we compare the past with the present, we are apt to be misled by a mistaken idea of the daily commonplace happenings of a time which antedates our own experience, and of which we know but little. It is probable that the reason for the increasing percentage of failures will be found not so much in the changed conditions of success in business, as in our different methods of seeking success, our changed ideas of what constitutes success, and our impatience of the restraints and limitations of a careful, prudent, conservative business policy. That, as we do business, it is harder to succeed now than it was a generation ago, is an obvious fact. Whether this is because we give less heed to the conditions of success is, perhaps, a question of sufficient interest to justify its consideration.

During the past few years so much capital has been diverted from the productive to the distributive industries, that nearly all branches of mercantile business are overdone. There is room for differences of opinion as to whether overproduction is possible, but it is quite evident that the facilities for the distribution of commodities can easily exceed the requirements of legitimate commerce. This is the case now and has been for some years past. The young man with capital to invest in any form of mercantile business, will be apt to have difficulty in chosing an occupation. He finds all the avenues of trade crowded by men who jostle and shoulder each other in the eager strife for a living; while the supply of those who seek employment as clerks, is always so far in excess of the demand for clerical services, that the young man who has opportunity to learn any business thoroughly and under conditions favorable to his advancement without the aid of capital, is fortunate above the average of his fellows. As the consequence, many engage in business for themselves without proper preliminary training, and the "pride of half knowledge" gives them a confidence in their business abilities which bears no just relation to their capacity.

For many reasons more capital is required to establish a business than was needed twenty or thirty years ago. Competition has cut down the margin of profit to so small a percentage that, to make a fair living, one must do a much larger trade than formerly. This necessitates the employment of a larger capital and the incurring of heavier expenses. But close competition has another and still more disastrous effect. It impels the merchant to take larger risks than he can safely assume. Almost any one willing to give a promise of payment can now-a-days get credit. What he cannot buy of one dealer he can of another, and those who can least afford to sustain the losses of bad debts are usually most ready to sell to doubtful customers on credit. Few of those who are not well established are willing to turn away a customer, however undesirable his patronage may be. In these days of high rents, when the tradesman feels it necessary to occupy the finest warehouse he can find, and to pay a rental which consumes a large percentage of his gross earnings, he must do business on a large scale, notwithstanding the risks. If not, his expenses will eat up his capital, and he must choose between the risks of loss and the certain ruin of a shrinkage in the volume of his business. Men forced to a choice of such alternatives naturally grow reckless; hence, credit is easy and failures frequent. The worst competition the honest tradesman experiences comes from those tottering on the verge of bankruptcy—and there are always some in this condition in every business. A man so situated will commonly take desperate chances. As the rule, he follows the utterly dishonest policy of buying all the goods he can and realizing on them as quickly as possible. If he can make a profit, well and good; if not, he must sacrifice them and meet maturing obligations by incurring a new and larger indebtedness. There is no meeting an illegitimate competition of this kind except by keeping out of it. The instinct of self-preservation should prompt this; if not, a due regard for the rights of his creditors should induce every honest tradesman who cannot do business without continuous and increasing loss, to close his store and wind up his affairs.

Other and serious difficulties for the average business man have grown out of the increased facilities for cheap and rapid inter-communication. Commerce is so sensitive to changing influences, that events happening in the morning on one side of the ocean may appreciate or depreciate the value of merchandise on the other side before nightfall. This makes competition all the keener, and tends to defeat the best laid plans based upon a forecast of the events of the future. The merchant of to-day who is successful in a large way needs to be a man of large intelligence, liberal views and ripe judgment. A man may succeed without seeming to possess conspicuous ability, but successes like that of Lord Timothy Dexter, who is best remembered on account of his famous and profitable shipment of warming pans to the West Indies, are not made nowadays.

We are not of those who advocate a return to the "slow and sure" method of doing business which old men claim to have followed when they were young. There will be no need of this until, like them, we get our mails weekly and buy our merchandise one box to the invoice. There is, however, good reason why we should bear in mind some of the fundamental rules of business success which our fathers seemed to understand somewhat better than we do. The trouble with a majority of business men nowadays seems to be that, to use a common phrase, they "carry too much sail." There is a constant temptation to expand their operations beyond the limits of safety, and to leave little or no margin for the inevitable contingencies of loss and disappointment, for shrinkage in values, dullness of trade and general disaster. There is too much recklessness in assuming great risks, and too much anxiety to overreach competition by means of "corners" and speculative movements to produce artificial conditions from which a temporary advantage may be gained. Again, we have been accustomed to elegant accommodations and high rents, until we have come to regard them as indispensable. Probably we shall become wiser in these matters before long, and young men beginning business will content themselves with accommodations within their means, trusting more to industry, economy and enterprise in laying the foundations of success than to black walnut and plate glass. That it is harder now to win a legitimate success in business than it was at any previous time in our history, we do not believe. The progress of a generation has made every human undertaking easier of accomplishment than it was before science had drawn the vast and imponderable couriers of nature into the service of man. The homely virtues of industry, honesty and thrift have as great a value as factors in the equation of success as they ever had, and the young man who enters commerce to-day with a determination to succeed by diligence in business, fair dealing and strict integrity, has vastly more chances in his favor than his father or grandfather enjoyed. He cannot, however, expect in any but exceptional cases to win success by bold strokes, or to leap into fortune by brilliant speculation. And it is because so many try this hazardous experiment that the percentage of failures is greater and for larger amounts than formerly.

The Torpedo in War.

The torpedo seems about to produce as great a revolution in the construction and management of ships of war as gunpowder did some hundreds of years since in the equipment and armament of soldiers. Since 1860 there has been a "struggle between guns and armor," and although the victory after each group contest seemed to be with the guns, the plate makers have been confident that it was only a question of money to build up armor too thick for any projectile to penetrate. Relying upon the fact that there were very few great guns in the world capable of penetrating the heaviest of armor plates, floating fortresses have been built or bought by all first and many second rate powers, each nation seeming to feel that it was absolutely essential to have a fleet of these unwieldy monsters for the preservation of the state. At the present moment we believe there are no vessels afloat capable of resisting at short range shot from the heaviest guns now manufactured. It is very true that heavier armor can be made, and that vessels can be built capable of floating it, but their size must be enormous, and the power required to drive them, even at a very moderate speed, must be proportionately large. But we have no assurance that the limit of the power of guns has been reached, and iron-clads which to-day are invulnerable may next year be penetrable by new and more powerful guns.

In spite of this, foreign powers have continued to waste money upon structures which it is almost certain will, in the course of three or four years, be superseded if the improvement in artillery continues. It would seem that the torpedo must put an end to all this. A boat, light and fast, and much too small for a target, but armed with a torpedo, has on more than one occasion utterly destroyed a powerful iron-clad. The following extract from one of the morning papers, is an illustration of what a torpedo boat may do:

On the night of May 25 the Russian boats left Braila. They are called "gunboats" in the dispatch; but it must be remembered they are craft which the Russians carried with them in sections, and which have been put together since they have been on the Danube. Lieutenant Denbasoff ran his little craft under the guns of the Turkish monitors at Matchin and exploded a torpedo under the largest one, which damaged, but did not altogether cripple her; then another boat of the expedition gave the same monitor a second torpedo, and she went down in 10 minutes. Evidently the Turks were as brave as they were helpless, for they continued their fire till the water stopped the muzzles of their guns; yet this tenaciously persistent fire was delivered so utterly at random that the little Russian craft alongside received no harm.

The Turkish boats were probably but lightly armored, but this makes little difference, since they were sufficiently powerful to have utterly destroyed the little craft that attacked them had the fight been with guns only. A torpedo launch which can make from 18 to 20 miles per hour, is not costly—in fact, could be built for less than a single gun of the largest size—and two or three of them could probably disable the largest and most powerful iron-clad afloat.

So important has this torpedo warfare become that Mr. E. J. Reed has recently discussed at some length the possibility of protecting a vessel's whole hull with armor. To do this it will be necessary to use a form for hull which shall approach that of the Russian circular iron-clads in order to get sufficient flotative power to carry it. Even with a vessel one hundred feet in diameter and with a draught of twenty feet, the plating could, if we remember the figures aright, be but thirteen inches in thickness. A ship of ordinary form could barely float with such a load, to say nothing of carrying engines and armament. But even this thickness is no guarantee against destruction by torpedoes, nor would it be safe to depend upon twice that thickness for absolute protection. The attack at sea is manifestly stronger than the defense, following the same rule that prevails upon the land, and the introduction of armor has done but little service, merely strengthening it for the time being. An unarmored vessel, built for speed, but carrying an armament of the heaviest guns and having powerful engines, would in all probability in an engagement prove herself far superior to any iron-clad afloat. By dispensing with the armor the speed can be increased beyond that of any iron-clad, and they could thus choose their own positions. The target such a ship presents to the enemy can be very small, and as long as she keeps in rapid motion the chances of her being struck are trifling. Against torpedo boats or torpedoes launched from such a craft, an iron-clad would be powerless. In the war ship of the future speed and easy handling are qualities which are far more likely to be the objects sought for than protection against shot and shell. The torpedo is likely to be met by the torpedo, however, and it would not be surprising if, under such circumstances, in a naval engagement half the force engaged went to the bottom. By the use of the torpedo it is quite posssible that the defense of harbors may become superior to the attack, thus reversing the present order of affairs.

Professor Raymond and The Iron Age.

At the Wilkesbarre meeting of the American Institute of Mining Engineers Prof. R. W. Raymond made some remarks which we cannot refrain from noticing. Alluding to our recent articles on the policy of the Institute in regard to its system of publication, he said that *The Iron Age* had lately "reiterated" its "malignant falsehoods" after he had "taken the pains to show the conductors of that journal their utter lack of truth." These may not be the exact words employed by Prof. Raymond, but they certainly represent fairly his angry and intemperate language. As no notice whatever was taken of his remarks by any one present, and several members afterward expressed a feeling of mortification, which we believe was general, we could very well afford to ignore them entirely, were it not that we desire to repel an imputation which, as Prof. Raymond knows, has not only no foundation in fact, but is glaringly and conspicuously untrue.

Our conduct of the late discussion has been fair and honest in a marked degree. It was begun only when our representative was denied the facilities necessary for reporting the meetings of the Institute. Mr. Raymond's reply to our first article was a personal attack on Mr. Weeks, charging him with bad faith in the publication of Mr. Bell's paper, and ending with a bitter insult to *The Iron Age*. Finding that there were some statements in our article which, though made in good faith, seemed to be too broad and general, we printed an article retracting such statements, as Mr. Raymond said in his next issue, "handsomely," "promptly" and "fully." In the same number of the *Journal*, however, appeared a letter from Mr. Weeks explicitly denying the charge of bad faith made against him, and detailing all the circumstances of the transaction. The only notice this received from Mr. Raymond was a supercilious and insulting refusal to discuss the matter. Our subsequent articles have consisted in a discussion of the policy of the Institute in regard to the publication of its papers, in which we have made no statements that are not either obviously true, or susceptible of abundant proof, and it is worth noticing that we have reprinted all the articles on the subject that have appeared in the *Journal*, while not one of ours has appeared in it.

At the Wilkesbarre meeting, when Mr. Weeks demanded an investigation of his action in regard to Mr. Bell's paper, Prof. Raymond was the only member who opposed it, alleging that the printing of Mr. Week's letter, before-mentioned, was all the vindication he ought to expect, and expressing his opinion that the matter was entirely too small to occupy the attention of a committee of the Institute. With the exception of Mr. Raymond, the matter was, we believe, unanimously referred to the Council for investigation.

Should Prof. Raymond find anything unpleasant in this article, we beg to remind him that his remarks at the Wilkesbarre meeting were distinctly and offensively personal, and that throughout the discussion he has done all in his power to make it bitter and acrimonious. It has certainly afforded us no satisfaction, and we regret that the necessity for it ever existed; but the reform we sought to promote, and to which Prof. Raymond alluded so contemptuously in a recent issue of his paper, was essential to the welfare of the Institute, and we trust that our efforts will not be without good results.

We are glad to see everywhere manifested a disposition to mete impartial justice to the thugs who commit crimes in the interest of the labor unions. The terrible spectacle of the simultaneous execution of five Molly Maguire murderers on the 21st prox., will doubtless have the effect of frightening the turbulent element in the anthracite district into a due respect for the power of the law and the rights of those whom the law protects. It was long deemed impossible to secure the conviction of any member of this order charged with crime committed in its interest, and law-abiding citizens have lived in daily fear of the unseen force which made itself felt in so many ways. That so many of these desperate men with blood-stained hands have been brought to the bar of the civil courts, convicted and sentenced, shows that there is yet hope for the safety of life and property in the mining districts. In Troy the union molders have lately followed the bad example of the Mollie Maguires, and are likely to earn the same wages. On Friday last a union molder, implicated in one of the numerous recent assaults upon the non-union molders working in the foundries, was convicted and sentenced to ten years imprisonment at hard labor in Clinton Prison. These warnings will not be without effect upon the turbulent spirits who have gained boldness in crime from long immunity from its consequences. The man who does not want to work has a perfect right to stand idle, so long as he does not become a pauper; but when by acts of violence, or even by threats and intimidation, he seeks to drive others away from the labor by which they earn support for themselves and families, he becomes a criminal, and the organizations for which he acts are like incendiary torches, to be stamped out and trodden into the earth.

Dr. Young, Chief of the Bureau of Statistics, furnishes some interesting statistics of our commerce for April. The aggregate imports and exports of merchandise for the month were: total exports, $44,515,439; total imports, $42,662,696; for the 10 months of the current fiscal year the exports of merchandise were valued at $514,799,053; the imports, $357,584,817, showing an excess of exports over imports of over $157,000,000. In the 10 months there was an excess of the exports of coin and bullion over imports of $2,824,145. The statistics of our trade with Great Britain during the four months ended with April show a considerable

shrinkage in volume and values. As compared with the first four months of 1876 the decrease in cotton piece goods amounts to 2476 yards; linen piece goods, 341,800 yards; woolen cloth, 234,800 yards; worsted stuffs, 6,399,500 yards; manufactures of jute, 4,075,200 yards; carpets, 351,000 yards; hardware and cutlery, $213,605. Other articles show a corresponding decrease, as, for instance, beer and ale, of which 3051 barrels less were received in the United States during the four months in 1876 than in the corresponding period of last year. Silk broadstuffs show an increase of 39,907 yards; iron and manufactures of iron an increase of 2133 tons, and tin plates an increase of 3741 tons. These figures are quite satisfactory, and indicate a sustained improvement in the condition and prospects of our foreign trade relations.

On the 29th the long overdue steamer, the City of Brussels arrived at Liverpool. When a few days out from New York she had the misfortune to break her shaft, which of course totally disabled her. The voyage under sail was a long one, for although the City of Brussels is a very fast boat, her great length, small breadth of beam and light spars combine to make her slow and unhandy under sail alone. This is the second accident of the kind that has happened to this vessel, each one causing a long voyage under sail. The frequency with which ocean steamers are disabled by the breaking of shafts and propellers, is so great as to demand serious attention and consideration. Many persons seem to consider it useless to attempt the construction of a shaft and propeller which shall be strong enough to stand the strain brought upon it in heavy sea way. This same opinion was held in regard to paddle machinery by the first engine builders in England who built the engines for the earlier packets which crossed the Irish sea. Almost every storm disabled them, and at first this was regarded as a part of the inevitable. John Bourne gives, in some of his reminiscences, a very interesting account of how the firm with which he was at that time connected looked at the matter, and finally built an engine that was strong enough for the work. Many of the propellers in use today, while amply able to resist any strain the engine can put upon them in legitimate work, are too weak to be trusted in a heavy sea. The wonder is that they last so long. We have known many vessels sent to sea with propellers cast from a common grade of foundry iron—good enough for use in pleasant weather or still water, but far too brittle for safety in case of a severe storm. Shafts, from a false notion of economy, are often made smaller than they should be. If such weak constructions must be used, certainly the rolling mill practice of a breaking piece should be introduced, by which the breaking of an important part is prevented by allowing a weak member, of which duplicates are provided, to give way. Usually the cost of one break down is great enough to pay for good material and plenty of it in both shafts and propeller. In the case of the City of Brussels one item of loss alone is stated at $30,000, or upward.

Yesterday's dispatches report a strike imminent upon the Pennsylvania Railroad among the locomotive engineers belonging to the Brotherhood. Both the engineers and the officers of the road are very reticent in regard to the matter and decline to make any statements. It seems probable, however, that the Brotherhood are about to make a desperate struggle to maintain the supreme control of railroad engineers which they have held for so long. The men composing the Brotherhood are the finest, considered as a class, of any which have ever formed a trade union in this or any other country. Intelligent, sober and industrious, in the receipt of large wages, they are a power in the land of no small importance. Their leaders appear to be carried away with the power of the union, and seem to think it is too great to be broken. A single road or a half dozen roads cannot well resist them; but they are misusing their power to such an extent, and are so overstepping the legitimate province of their association, that they have become the enemies of the whole commonwealth, and before long they will find that not the railroads, but society is at war with them. One result only can follow unless a rapid and sudden change in their policy takes place, and that is the total destruction of the Brotherhood of Locomotive Engineers. From present appearances there is no prospect that they will take warning in season.

War helps a great many trades. A paper concern in Ohio has an order for 250 tons of paper for cartridges for Turkey, and a Pennsylvania town is shipping about 600 tons of spelter to Europe as fast as it can be made, also for cartridges.

AMERICAN INSTITUTE OF MINING ENGINEERS.

Abstract of Proceedings at the Wilkesbarre Meeting.

*Can We Transmit Power in Large Amounts by Electricity.**

Mr. Keith in introducing his paper stated that the question was suggested by Dr. Siemens' statement regarding the transmission of energy electrically, a continuous rod of copper 30 miles long and 3 inches in diameter being capable of transmitting 1000 horse-power.

As a preliminary to consideration of the subject, the science of the correlation of the forces was summarized. Proceeding with the discussion, Mr. Keith stated that while there was but one electricity there are two conditions of it, namely, *static*, which is electricity at rest, but under high tension, and *voltaic* or *galvanism*, which is a mode of motion. For perspecuity we use other names, as frictional, chemical, voltaic, magnetic, &c. As chemical and thermic electricity are too costly for our purpose we must consider the magnetic and dynamic.

As an entity electricity does not exist; it is a signification simply. Disabusing one's mind of the idea that it is a current or flow of something, the probability is that the electric current is molecular change of form, caused by tension upon the atoms composing the molecules in the direction of disrupting them. Energy, when used as electricity, is called *electro-motive force*. This varies in degree with its tension. The tension of a spring may illustrate the electro-motive force of static electricity, which imparts its changed energy with a single impulse. A suspended weight released, increases its speed with each foot of fall, and, consequently, its force and effective quantity. So with voltaic electricity; each cell in circuit increases the speed and quantity of current. In case of dynamic electricity each increment of circuit securing electric impulse, adds to speed and quantity of current.

The resistance which matter offers to change of form or management, and which is specific for each substance, has been tabulated—as to the electro motive force—relatively in the cases of metals common in the arts and of the important alloys. Copper and silver offer the least resistance. Heat increases the resistance about 2 10 of 1 per cent. per degree Fah.

Ohm's law was stated to be "that the current of electricity is the result obtained by dividing electro-motive force by resistance; thus, $\frac{E}{R} = C$.

The unit of electro-motive force is called a *volt*. The unit of resistance is called an Ohm. A wire of pure copper 6046·5 feet in length and ⅛ inch in diameter has a resistance of one Ohm. The unit of current or quantity is called a weber, or veber. One volt of electro-motive force forces one veber of electric current through a circuit of one Ohm resistance, requiring to do so 4673 foot pounds of energy, with a development of 6 units of heat in the circuit in 6338 seconds. The heat set free is the exact measure of the force used. Chemical decomposition is the measure of current heat of electro-motive force multiplied by current. Increasing definitely the amount of electro-motive force, and at the same time keeping resistance as low as possible, we may use a definite amount of energy and distribute it as heat throughout the circuit in proportion to the special resistance of its parts, and utilize it as mechanical power. The object of increase in E at the expense of C, is that we may save in weight of copper constituting the conductor.

If we alternately magnetize and demagnetize a core of soft uncarbonized iron within a coil of copper wire, we will get a succession of discharges of magnetism through the copper coil, utilized as electricity. While the core is acquiring magnetism there is no current in the coil, as there is no magnetic resistance to motion which requires force to overcome. As soon as it begins to lose magnetism an electric current is induced in the coil, which we may cause to do work by proper mechanical appliances. The coil and core are heated and the amount of heat is the measure of the mechanical force used, less that due to friction of the journals. If the circuit is made complete by a conductor, then the heat will be divided between the coil and conductor in proportion to their respective resistance. If this conductor be the coils of an electro-motor, the heat due to it can be utilized as work less loss by conversion.

Having laid down the general requirements, Mr. Keith proceeded to plan a theoretical machine to answer Dr. Siemens' requirements. The resistance of wire of the same diameter being in direct proportion to its length, from a previous statement, 30 miles of ¼ inch wire would have 26 Ohm's resistance, but as it also decreases in proportion to the square of the diameters, a three inch rod would have a resistance of ·18 Ohm if of pure copper at a temperature of 60 degrees Fahrenheit.

The energy of 1000 horse-power is 33,000,000 foot pounds per minute, and of 1 veber current 44·24 foot pounds per minute, so it will require 746,000 vebers current, or their equivalent in energy to utilize 1000 horse-power as electricity for dynamic purposes. We may therefore use electro-motive force of 1000 volts, resistance of 1·34 Ohms, and a current of 746 vebers; thus $\frac{1000 \text{ E.}}{1{\cdot}34 \text{ R.}} = 746 \text{ C.}$ In other words, the dynamic equivalent of 746,000 vebers may be had by multiplying the electro-motive force 1000 by the current 746.

From known facts Mr. Keith deduces that 1000 volts electro-motive force will take 25,000 feet in length of copper wire or strips weighing 1·2 pounds per foot length, or in all 30,000 pounds. This will have a resistance of ·66 Ohm. It should be wound about a core of iron weighing 10,000 pounds. This core and coil must be revolved between the poles of an electro-magnet, having such an attraction for the armature as to call for the expenditure of 1000 horse-power in revolving it. Such a magnet will weigh probably 60,000 pounds and have a like weight of copper in its coils. The necessity for a smaller armature, revolved between the poles of a smaller magnet, to excite or magnetize the larger magnet, was shown. From various considerations Mr. Keith deduces that it is necessary to make the resistance of the machine ·50 Ohm, necessitating a weight of copper coils per foot of 3·17 pounds—a total of 79,200 pounds—with a weight of iron about 70,000 pounds. The cost of this apparatus will be as follows:

Machine	$40,000
Conductor	1,411,800
Motor	33,200

The energy of 1000 horse-power generating the electric current is distributed as follows: The armature absorbs 492·5 horse-power; the conductor, 134·3; the motor, 373·2. This last amount is all that can be utilized with this arrangement, even if there is no loss.

Mr. Keith considered various resistances, reaching the results that under no circumstances could the full power expended be utilized, but that, with a larger conductor or shorter distance, the proportion of horse-power absorbed by the motor could be increased.

Mr. Keith concludes that at least half of the energy expended in a magneto-electric or dynamo-electric machine at a waterfall, may be used at a distance by an electro-magnetic motor as mechanical power.

DISCUSSION ON MR. KEITH'S PAPER.

Mr. Holley stated that he had heard Dr. Siemens' paper, and the theory advanced, coming as it did from such an eminent authority, had been received and largely commended by the scientific press and other journals, such as the London *Times*, without going into the calculations necessary to prove its correctness. He was pleased to see the subject taken up by an American engineer, and congratulated the Institute that it had put Dr. Siemens on the defensive.

Mr. Keith stated that his purpose in presenting the subject to the Institute was to attract their attention to electricity, the applications of which are being largely increased and the possibility of its application very great. As instances, he mentioned its application to blasting, in the telephone, and in metallurgy in the treatment of copper ores.

Prof. Raymond desired to ask a question or two. If I correctly understand the course of the argument, there is a constant loss in the transmission of the electro-motive force that is directly proportional to the distance. Am I correct?

Mr. Keith: If size remains the same.

Prof. Raymond: This being so, if a conductor of greater length than 30 miles—the cost of which is $1,485,000—is used, the resistance will soon be so great as to absorb the power. This is a death blow to Dr. Siemens' theory. If the cost of transmission and loss of power are so great at 30 miles, when we attempt to transmit power to greater distances, as to the coal regions, these will be so large as to prohibit such transmission. So for transmission of large amounts of power, the method proposed by Dr. Siemens will hardly come into use; but for small amounts and small distances it may. For example, when it is necessary to keep the source of power at a distance from the place of application, as we have had an example to-day at Gen. Oliver's powder mill. Another example would be in its application to domestic purposes. In regard to the application of electricity to electro-metallurgy, I would like to ask regarding its application to nickel ores.

Mr. Keith: It is almost impossible to precipitate nickel alone. If copper is present it will be precipitated first; if iron and nickel, they will be precipitated together.

Mr. Munroe: At Philadelphia my attention was called to the feasibility of the transmission of power, by an exhibitor of a dynamic machine. I was told, though I do not vouch for the truth of the statement, that an attempt was made to transmit power from one of these machines over the tin roof of the building, and to use the power to drive a Burleigh drill. It was stated that the power transmitted was about 6 horse-power.

Mr. Keith spoke of the various applications of electricity shown at the Centennial, and also of its use at Wallace's, at Ansonia, Conn., in depositing copper on wire.

Mr. E. B. Coxe: The method of transmitting power referred to in the paper, would be very valuable in mines. Power is very often needed in stopes and shafts for temporary purposes—say, for three or four weeks' time or less—and some such method as this would be very serviceable.

* Abstract of a paper read at the May meeting of the American Institute of Mining Engineers, by N. S. Keith.

*Notes on Fire Brick Stoves for Blast Furnaces.**

In introducing his paper, Mr. Hartman spoke of the two systems of heating the blast. 1st. The double surface, consisting of a cast iron pipe heated on the outer surface and the heat abstracted on the inner at the same time, giving a continuous effect, simple in operation, but limited to a heat of 1100° maximum. 2d. The single surface, in which large surfaces of firebrick are heated and the air passed over the same; a more complex system than the other, the air and gas being reversed every 1½ hours. The advantages of the latter system are: 1st. A maximum temperature of 1800°. 2d. Indestructibility of stoves.

Recent experiments have shown that 1300° to 1400° is the best average heat for economy of coal and safe working. This is equivalent to 1½ to 2 cwt. of coal per ton of iron over the extreme limit of cast iron stoves.

An additional advantage is possessed in the ability to pour into the furnace in one hour's time air heated to 1800°, when from any cause, such as leaky tuyeres, scaffolds or heavy burdens, the hearth is getting cold. Examples of its effect in restoring a furnace to its proper working, when disordered from these and other causes, were given, showing that the higher heat it is possible to pour into the furnace the same result can be obtained as is obtained by a change of burden, without the delay necessary in such a change traveling from the tunnel head.

For some years Mr. Hartman stated he had been collecting the results of the working of brick stoves, declining to give up iron stoves until good results could be obtained with the brick stoves, both at home and abroad. The Cedar Point Iron Company have demonstrated that they can save fuel by the brick stoves, and we find that the failure at other places is due to the stoves being too small. At Cedar Point there are four stoves 22x30 feet, with a heating surface of 35,200 feet. Their average heat is 1375°, with maximum of 1750°. They have 4 feet heating surface to each cubic foot of air per minute, and get a carbon duty of 3·13 on a basis of No. 3 iron. They change a stove or furnace every two hours, and leave off escaping gas at 200°. At Rising Fawn, Ga., with three stoves, 18x30, containing 17,400 feet surface, they average but 1000°, with 1200° for maximum. They have two square feet surface for each cubic foot of air, and get a carbon duty of 2·35. Their escaping gas goes off at 650°, which is a loss of 450° in the gas, and 375° in the blast, changing stoves every hour.

It has been found on using 9 inch walls, and changing every two hours, that the heat being reduced to a minimum, and stoves shut up, that in three hours or so the exterior of walls becomes hot. This was repeated twice in succession, showing the necessity of thinner walls and increased surface, as the storage of heat in the interior of the wall is not available in the time required to lower temperature to minimum, owing to the slow conducting power of the fire brick.

The valves of the stove require constant attention. When bell and hopper are used the temperature of the escaping gas is so low that there is no danger of harming the gas valve. When the heating surface is small, and the escaping gas goes off at high temperature, the chimney valve must be cooled with water. The hot-blast valve may be cooled either by water or cold-blast, the water, however, being objectionable from the liability to explosions in case of leakage.

Mr. Hartman stated that after a careful comparison of stoves he had taken up the Siemens-Cowper-Cochran stoves. The cellular arrangement of these stoves gives a large surface of contact, while the thinness of the walls admits of heat being abstracted thoroughly, so that there is no waste stowage that is not available in the 1½ hours the stove is on furnace. We propose 3 stoves—2 on gas—and use 5 ft. surface to each cubic foot of air. This will allow escaping gases to go off at 150°. When one stove of a set of 10,000 ft. capacity per minute is heated up it contains 127,631,000 F. calorics, and the blast abstracts from it in 1½ hours, 19,890,000 calorics. The regenerator alone contains 63,223,200 calorics when heated up, and not more than one-half its capacity will be exhausted when clean, to give the desired temperature. There are five valves to operate, which is less than on other stoves. There being but one flame flue, perfect combustion is secured with one air-valve. The hot-blast valve is cooled by a small current of cold air. The absence of water in all of the valves is a strong point in their favor. By the use of two simple dust-catchers in the down flue and blowing through the ovens once a week, the Ebbw Vale Works find their stoves as efficient at the end of two years as when started. Mr. Cowper has found that firing a gun into the stove while blast is on, is a good means of cleaning the dust by the vibration of the passing current. The most effectual cleaning is with a steel brush weighted, attached to a small wire rope and dropped down through each hole. To avoid the objection that the projection of the brick in the regenerator cells affords a good opportunity for the collection of dust, we propose beveling off these corners. The thin walls of the regenerator offer to the gas and air five-sixths of their surface, while a brick built in a 9 inch wall offers only one-sixth. It is this dividing the air into thin strips that so effectually heats the blast. To avoid the variation of temperature in changing stoves, I propose to introduce a certain amount of cold air by means of an automatic valve. The cost of these stoves complete, where No. 1 fire brick is $34 per 1000, is about $3 per cubic foot air per minute, and if built to run only 1100°, they can be made at same cost as iron stoves, and are more durable.

Mr. Cochrane, of Dudley, England, writes that after trials of 9 to 11 months he finds the following results: Furnace 23x76, 20,000 feet capacity, 900°=25¼ cwt. coke to ton iron; 1100°=23¼ cwt.; 1300°=20⅞ cwt.; 1500°=20 cwt., and in larger furnaces they get the total consumption lower.

DISCUSSION ON MR. HARTMAN'S PAPER.

Mr. Pechin called attention to the fact that Mr. Whitwell had recently reduced the cost of building his stoves by diminishing the diameter and increasing the hight, which enabled him to dispense with a portion of the expensive ironwork at the bottom of the stoves.

Mr. Birkenbine referred to the erection of some Whitwell stoves at Catasauqua, and thought that he could undertake to erect good iron stoves at a much less price.

Mr. Raymond described the stoves used at Durham. They got 900° out of these regularly, but should have no difficulty in getting 1000°.

Mr. Hartman stated that these stoves at Durham were capable of carrying 1100°. These stoves have some peculiarities, and exceed in their work any iron stoves I have ever seen. Through the peculiar way in which the gas is burned, the pipes are all a beautiful red glow.

Mr. Pechin: How do you know you get 1100°?

Mr. Hartman: We can melt zinc 3 or 4 inches off. In an 18x30 Cowper stove we have twice the heating surface that we have in any other brick stove. Another advantage of the Cowper is that it presents less resistance to the passage of the gas than the Whitwell.

*Note on Cost of Six Regenerative Furnaces Built in 1875, at the Edgar Thomson Steel Works, near Pittsburgh, for Heating Steel Ingots and Blooms.**

These furnaces are of the ordinary Siemens type, and present no special peculiarities. The bed of each is 8x20 ft. in the clear, inside of walls and ports.

The producers are placed 200 feet from the furnaces, and the gas collected in an iron tube and led across the yard under ground. A considerable weight of floor plate for covering this tube is included in account 39, but none of the general stock of floor plates. In the smaller table is shown the money cost of the furnaces. The larger one shows the proportion of each account to each of the several items or classes of expenditures named. The regular work of these furnaces for January and February of this year, was 77 rounds per week of 66 blooms each, or 4620 36-ft. rails per week. Each furnace will heat eight 14 inch ingots for three rails each at one time:

COST OF SIEMENS FURNACE.

Items.	Class.	Accounts. 35	36	37	38	39
1	Lime	·026	....	....	·0·34	....
2	Sand	·026	....	·018	0155	....
3	Cement	·039	....	·149	·0·34	....
4	Rubble and concrete	·186	....	·084	·1096	....
5	Red brick	·123	·00·	·254	·452	....
6	Fire brick and clay	·370	....	....	·4985	....
7	Bricklaying	·213	....	·166	·1532	....
8	Skilled labor	·041	·037	·043	·0754	·0261
9	Common labor	·037	·047	·048	·0422	·0627
10	Teams	·028	·009	·077	·0400	....
11	Bar Iron	....	·069	....	....	·0239
12	Castings	....	·312	·094	....	·5654
13	Plate Iron	....	·007	·036	....	·1177
14	Cooling tubes	....	·430	....	....	....
15	Iron beams	....	·046	....	....	·0103
16	Valves	....	....	....	....	·1866
17	Charging hopper	....	·425	....	....	....
18	Lumber	....	·013	·001	·026	....
19	Hardware	....	....	....	....	·0073
	Total	1·000	1·000	1·000	1·000	·000

Account.	Class.	Money.	Per ct.
35	Producer brickwork	$8,087	·112
36	" castings	9,996	·138
37	Gas flue	4,777	·066
38	Furnace brickwork	29,705	·414
39	" castings	19,472	·270
	Total	$72,037	1·000

REMARKS ON MR. BARNES' PAPER.

Mr. A. L. Holley, who read this paper, or, as he termed it, "note," in the absence of Mr. Barnes, expressed his opinion as to the great importance of such estimates as this and others presented at previous meetings by Mr. Barnes. In his own profession he had found such estimates particularly useful in estimating cost. Many of the members of the Institute had such estimates, or could make them with very little trouble, as they would have most of the data, and he urged members to present such tables of cost of work in their line at future meetings.

Mr. S. J. Randall on our South American Trade.—Hon. S. J. Randall, in a letter to the leading citizens of Galveston, says: The time has come, in my opinion, when the policy of the government should be to enlarge our trade relations with Mexico and with the Central and South American States. It is well for us to study the statistics of the trade between these countries and the markets of the world, from which we find that the people of the United States are not receiving a due share of the commerce of the countries I have named. We need more favorable commercial relations and more comprehensive trade connections with other nations. Let me cite a few figures to prove the truthfulness of my assertion. The public documents show the foreign commerce of the countries lying south of the United States on the American continent to be about $520,000,000. Our share of this amount is about $112,000,000, of which only about $37,000,000 is transported in American vessels and under the American flag. Such a statement should at once arouse our people from their lethargy. The war stimulated the manufacturing facilities of the North enormously, and only by the adoption of such a policy can we keep up the activity of our manufacturing districts and secure a market for our productions. It is a discredit to our enlightenment that we as a people stand quietly by and do not make sufficient endeavor to increase our meager share of this important trade. When the extended policy to which I have referred is inaugurated, as it must and will be, then will your city, your State and the entire coast of the Gulf, receive the advantages which nature has bespoken for them.

The Time Lock Patents.—The two interference cases, involving the right to a patent for an improvement in "time locks" for safes, vaults, &c., between James Sargent, of New York, and the Yale Lock Manufacturing Company, assignee of John Burge, which have been pending in the Patent Office, and which were argued before the commissioner on final appeal a few weeks ago, were both decided on the 26th inst. by Gen. Spear, Commissioner of Patents, in favor of Sargent, thus ending a long and vigorously contested controversy. The decision of the commissioner in both cases affirms that of the Examiner of Interferences and of the Board of Examiners in Chief.

* Abstract of a paper read before the May meeting of the American Institute of Mining Engineers, by J. M. Hartman.

* Abstract of a paper presented at the May meeting of the American Institute of Mining Engineers, by P. Barnes.

Prehistoric Science and Art.

In an address lately delivered before the Section of Biology of the British Association, Mr. A. R. Wallace presented the following interesting facts:

It is a somewhat curious fact that, while all modern writers admit the great antiquity of man, most of them maintain the very recent development of his intellect, and will hardly contemplate the possibility of men equal in mental capacity to ourselves having existed in prehistoric times. This question is generally assumed to be settled by such relics as have been preserved of the manufacturers of the olden races, showing a lower and lower state of the arts—by the successive disappearance in olden times of iron, bronze and pottery, and by the ruder forms of the older flint implements. The weakness of this argument has been well shown by Mr. Albert Mott in his very original but little known presidential address to the Literary and Philosophical Society of Liverpool, in 1873. He maintains that "our most distant glimpses of the past are still of a world peopled as now with men both civilized and savage," and "that we have often entirely misread the past by supposing that the outward signs of civilization must always be the same, and must be such as are found among ourselves." In support of this view he adduces a variety of striking facts and ingenious arguments, a few of which I will briefly summarize. On one of the most remote islands of the Pacific—Easter Island—2000 miles from South America, 2000 from the Marquesas, and more than 1000 from the Gambier Islands, are found hundreds of gigantic stone images, now mostly in ruins, some 30 or 40 feet high, while some seem to have been much larger, the crowns on their heads cut out of red stone, being sometimes 10 feet in diameter, while even the head and neck of one is said to have been 20 feet high. These once stood erect on extensive stone platforms, yet the island has only an area of about 30 square miles, or considerably less than Jersey. Now as one of the smallest images—8 feet high—weighs 4 tons, the largest must weigh over 100 tons, if not much more; and the existence of such vast works implies a large population, abundance of food, and an established government. Yet how could these coexist in a mere speck of land wholly cut off from the rest of the world? Mr. Mott maintains that this necessarily implies the power of regular communication with larger islands or a continent, the arts of navigation and civilization much higher than now exist in any part of the Pacific. Very similar remains in other islands scattered widely over the Pacific, add weight to this argument. The next example is that of the ancient mounds and earthworks of the North American continent, the bearing of which is even more significant.

Over the greater part of the extensive Mississippi Valley four well marked classes of these earthworks occur. Some are camps or works of defense, situated on bluffs, promontories, or isolated hills; others are vast inclosures in the plains and lowlands, often of geometric forms, and having attached to them roadways or avenues often miles in length; a third are mounds corresponding to our tumuli, often 70 to 90 feet high, and some of them covering acres of ground, while a fourth group consist of representations of various animals modeled in relief on a gigantic scale, and occurring chiefly in an area somewhat to the northwest of the other classes, in the plains of Wisconsin.

The first class—the camps or fortified inclosures—resemble in general features the ancient camps of our own islands, but far surpass them in extent. Fort Hill, in Ohio, is surrounded by a wall and ditch a mile and a half in length, part of the way cut through solid rock. Artificial reservoirs for water were made within it, when at one extremity, on a more elevated point, a keep is constructed with its separate defenses and water reservoirs. Another, called Clark's work, in the Scioto Valley, which seems to have been a fortified town, incloses an area of 17 acres, the embankments measuring 3 miles in length, and containing not less than 3,000,000 cubic feet of earth. This area incloses numerous sacrificial mounds and symmetrical earthworks in which many interesting relics and works of art have been found. The second class—the sacred inclosures—may be compared for extent and arrangement with Avebury or Carnak, but are in some respects even more remarkable. One of these at Newark, Ohio, covers an area of several miles with its connected groups of circles, octagons, squares, ellipses and avenues, on a grand scale, and formed by embankments from 20 to 30 feet in hight. Other similar works occur in different parts of Ohio, and by accurate survey it is found not only that the circles are true, though some of them are one-third of a mile in diameter, but that other figures are truly square, each side being over 1000 feet long, and what is still more important, the dimensions of some of these geometrical figures in different parts of the country and 70 miles apart, are identical. Now this proves the use, by the builders of these works, of some standard measures of length, while the accuracy of the squares, circles, and, in a less degree, of the octagonal figures, shows a considerable knowledge of rudimentary geometry and some means of measuring angles. The difficulty of drawing such figures on a large scale is much greater than anyone would imagine who has not tried it, and the accuracy of these is far beyond what is necessary to satisfy the eye. We must, therefore, impute to these people the wish to make these figures as accurate as possible, and this wish is a greater proof of habitual skill and intellectual advancement than even the ability to draw such figures. If, then, we take into account this ability and this love of geometric truth, and further consider the dense population and civil organization implied by the construction of such extensive systematic works, we must allow that these ancient people had reached the earlier stages of a civilization of which no traces existed among the savage tribes who alone occupied the country when first visited by Europeans.

The animal mounds are of comparatively less importance for our present purpose, as they imply a somewhat lower grade of advancement; but the sepulchral and sacrificial mounds exist in vast numbers, and their partial exploration has yielded a quantity of articles and works of art which throw some further light on the peculiarities of this mysterious people. Most of these mounds contain a large concave hearth or basin of burned clay of perfectly symmetrical form, on which are found deposited, more or less, abundant relics, all bearing traces of the action of fire. We are, therefore, only acquainted with such articles as are practically fire-proof or have accidentally escaped combustion. These consist of bone and copper implements and ornaments, discs and tubes, pearl, shell and silver beads, more or less injured by fire; ornaments cut in mica, ornamental pottery, and numbers of elaborate carvings in stone, mostly forming pipes for smoking. The metallic articles are all formed by hammering, but the execution is very good; plates of mica are found cut into scrolls and circles; the pottery, of which very few remains have been found, is far superior to that of any of the Indian tribes, since Dr. Wilson is of opinion that it must have been formed on a wheel, as it is often of uniform thickness throughout (sometimes not more than one-sixth of an inch), polished and ornamented with scrolls and figures of birds and flowers in delicate relief.

But the most instructive objects are the sculptured stone pipes, representing not only various easily recognizable animals, but also human heads so well executed that they appear to be portraits. Among the animals, not only are such native forms as the panther, bear, otter, wolf, beaver, raccoon, heron, crow, turtle, frog, rattlesnake, and many others well represented, but also the manatee, which perhaps then ascended the Mississippi as it now does the Amazon, and the toucan, which could hardly have been obtained nearer than Mexico. The sculptured heads are especially remarkable, because they present to us the features of an intellectual and civilized people. The nose in some is perfectly straight, and neither prominent nor dilated, the mouth is small and the lips thin, the chin and upper lip are short, contrasting with the ponderous jaw of the modern Indian, while the cheek bones present no marked prominence. Other examples have the nose somewhat projecting at the apex in a manner quite unlike the features of any American indigenes, and, although there are some which show a much coarser face, it is very difficult to see in any of them that close resemblance to the Indian type which these sculptures have been said to exhibit. The few authentic crania from the mounds present corresponding features, being more symmetrical and better developed in the frontal region than those of any American tribes, although somewhat resembling them in the occipital outline; while one was described by its discoverer (Mr. W. Marshall Anderson) as a "beautiful skull worthy of a Greek."

The antiquity of this remarkable race may, perhaps, not be very great, as compared with the prehistoric man of Europe, although the opinion of some writers on the subject seems affected by that "parsimony of time" on which the late Sir Charles Lyell so often dilated. The mounds are all overgrown with dense forest, and one of the large trees was estimated to be 800 years old, while other observers consider the forest growth to indicate an age of at least 1000 years. But it is well known that it requires several generations of trees to pass away before the growth on a deserted clearing comes to correspond with that of the surrounding virgin forest, while this forest, once established, may go on growing for an unknown number of thousands of years. The 800 or 1000 years estimate from the growth of existing vegetation is a minimum which has no bearing whatever on the actual age of these mounds, and we might almost as well attempt to determine the time of the glacial epoch from the age of the pines or oaks which now grow on the moraines. The important thing for us, however, is that when North America was first settled by Europeans, the Indian tribes inhabiting it had no knowledge or tradition of any preceding race of higher civilization than themselves. Yet we find that such a race existed; that they must have been populous and have lived under some established government; while there are signs that they practiced agriculture largely, as indeed they must have done to have supported a population capable of executing such gigantic works in such vast profusion—for it is stated that the mounds and earthworks of various kinds in the State of Ohio alone amount to between 11,000 and 12,000. In their habits, customs, religion and arts they differed strikingly from all the Indian tribes; while their love of art and of geometric forms, and their capacity for executing the latter upon so gigantic a scale, render it probable that they were a really civilized people, although the form their civilization took may have been very different from that of later people subject to very different influences, and the inheritors of a longer series of ancestral civilization.

We have here, at all events, a striking example of the transition, over an extensive country, from comparative civilization to comparative barbarism, the former having left to tradition, and hardly any trace of influence on the latter. As Mr. Mott well remarks: Nothing can be more striking than the fact that Easter Island and North America both gave the same

[Continued on page 19.]

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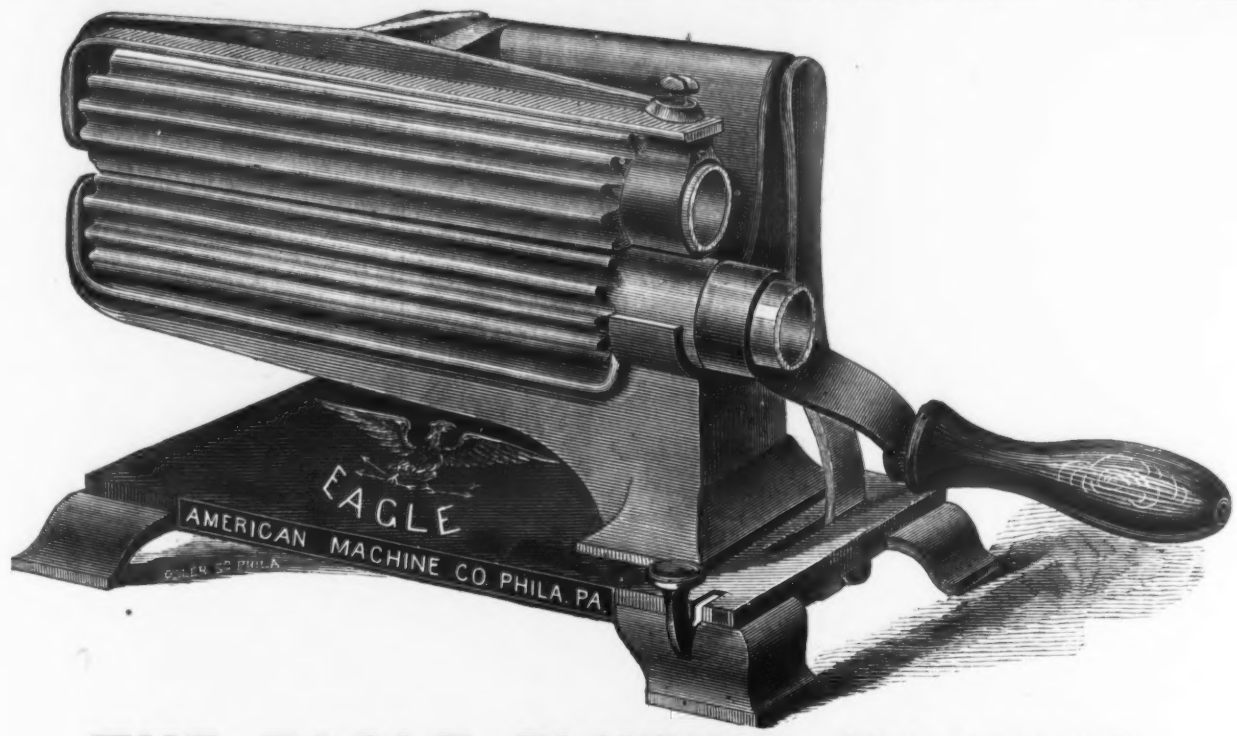

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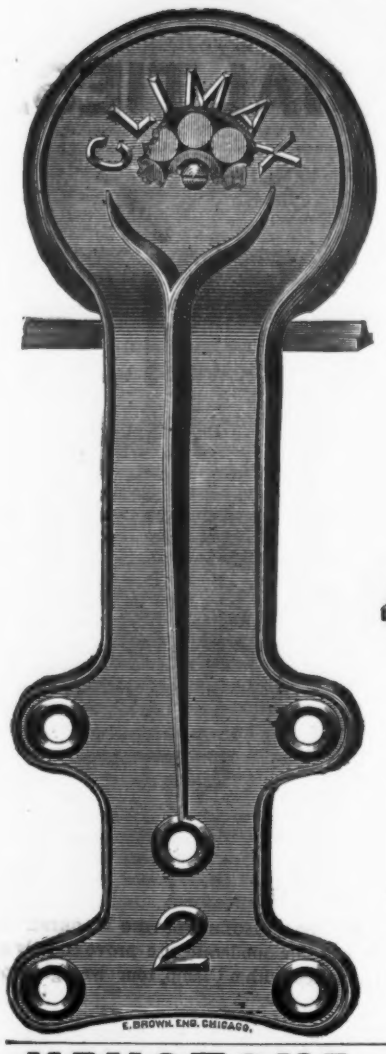

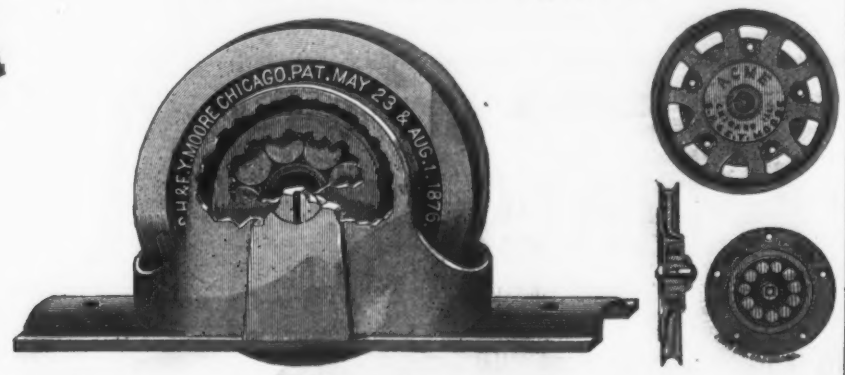

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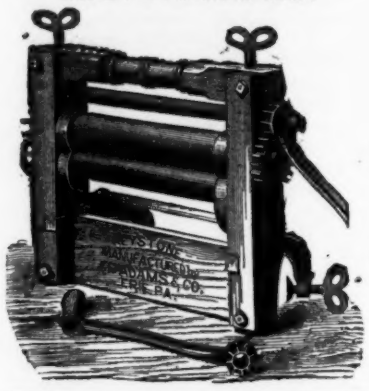

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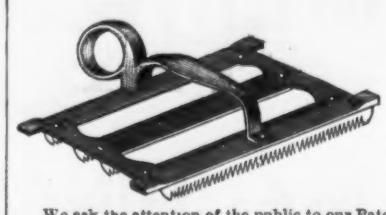

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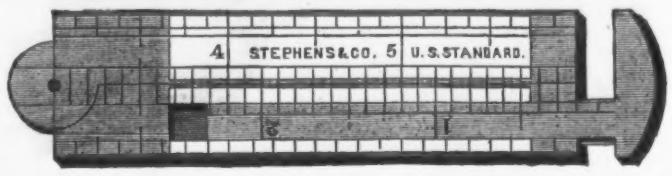

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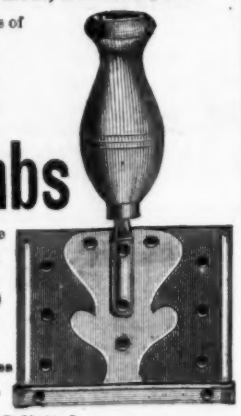

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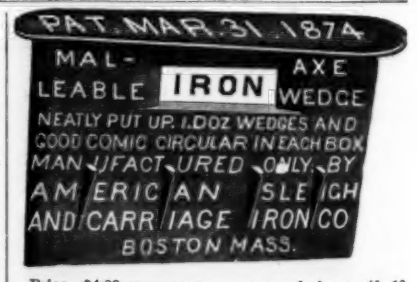

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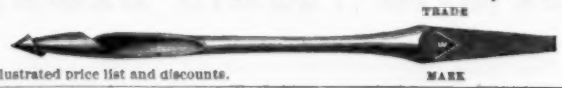

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[Continued from page 16.]

Prehistoric Science and Art.

testimony as to the origin of the savage life found in them, although in all circumstances and surroundings the two cases are so different. If no stone monuments had been constructed in Easter Island, or mounds containing a few relics saved from fire in the United States, we might never have suspected the existence of these ancient peoples. He argues, therefore, that it is very easy for the records of an ancient nation's life entirely to perish, or to be hidden from observation. Even the arts of Nineveh and Babylon were unknown only a generation ago, and we have only just discovered the facts about the mound builders of North America. But other parts of the American continent exhibit parallel phenomena. Recent investigations show that in Mexico, Central America and Peru, the existing race of Indians has been preceded by a distinct and more civilized race. This is proved by the sculptures of the ruined cities of Central America, by the more ancient terra cottas and paintings of Mexico, and by the oldest portrait pottery of Peru. All alike show markedly non-Indian features, while they often closely resemble modern European types. Ancient crania, too, have been found in all these countries, presenting very different characters from those of any of the modern indigenous races of America.

There is one other striking example of a higher being succeeded by a lower degree of knowledge, which is in danger of being forgotten because it has been made the foundation of theories which seem wild and fan'astic, and are probably in great part erroneous. I allude to the Great Pyramid of Egypt, whose form, dimensions, structure and uses have recently been the subject of elaborate works by Prof. Piazzi Smyth. Now, the admitted facts about this pyramid are so interesting and so apposite to the subject we are considering, that I beg to recall them to your attention. Most of you are aware that this pyramid has been carefully explored and measured by successive Egyptologists, and the dimensions have lately become capable of more accurate determination, owing to the discovery of some of the original casing stones and the clearing away of the earth from the corners of the foundation, showing the sockets in which the corner stones fitted. Prof. Smyth devoted many months of work with the best instruments in order to fix the dimensions and angles of all accessible parts of the structure, and he has carefully determined these by a comparison of his own and all previous measures, the best of which agree pretty closely with each other. The results arrived at are: 1. That the pyramid is truly square, the sides being equal and the angles right angles. 2. That the four sockets on which the first stones of the corners rested are truly on the same level. 3. That the direction of the sides are accurately to the four cardinal points. 4. That the vertical hight of the pyramid bears the same proportion to its circumference at the base as the radius of a circle does to its circumference.

Now, all these measures, angles and levels are accurate, not as an ordinary surveyor or builder could make them, but to such a degree as requires the very best modern instruments and all the refinements of geodetical science to discover any error at all. In addition to this, we have the wonderful perfection of the workmanship in the interior of the pyramid, the passages and chambers being lined with huge blocks of stone fitted with the utmost accuracy, while every part of the building exhibits the highest structural science. In all these respects this largest pyramid surpasses every other in Egypt. Yet it is universally admitted to be the oldest, and also the oldest historical building in the world. Now, these admitted facts about the Great Pyramid are surely remarkable, and worthy of the deepest consideration. They are facts which, in the pregnant words of the late Sir John Herschel, "according to received theories ought not to happen," and which, he tells us, should therefore be kept ever present to our minds, since "they belong to the class of facts which serve as a clew to new discoveries."

According to modern theories the higher civilization is ever a growth and an outcome from a preceding lower state; and it is inferred that this progress is visible to us throughout all history, and in all the material records of human intellect. But here we have a building which marks the very dawn of history—which is the oldest authentic monument of man's genius and skill, and which, instead of being far inferior, is very much superior to all which followed it. Great men are the products of their age and country, and the designers and constructors of this wonderful monument could never have arisen among an unintellectual and half barbarous people. So perfect a work implies many preceding less perfect works which have disappeared. It marks the culminating point of an ancient civilization, of the early stages of which we have no record whatever.

The three cases to which I have now adverted (and there are many others) seem to require for their satisfactory interpretation a somewhat different view of human progress from that which is now generally accepted. Taken in connection with the great intellectual power of the ancient Greeks—which Mr. Galton believes to have been far above that of the average of any modern nation—and the elevation, at once intellectual and moral, displayed in the writings of Confucius, Zoroaster and the Vedas, they point to the conclusion that, while in material progress there has been a tolerably steady advance, man's intellectual and moral development reached almost its highest level in a very remote past. The lower, the more animal, but often the more energetic types, have, however, always been far the more numerous; hence such established societies as have here and there arisen under the guidance of higher minds have always been liable to be swept away by the incursions of barbarians. Thus in almost every part of the globe there have been a long succession of partial civilizations, each in turn succeeded by a period of barbarism; and this view seems supported by the occurrence of degraded types of skull along with such "as might have belonged to a philosopher"—at a time when the mammoth and the reindeer inhabited Southern France. Nor need we fear that there is not time enough for the rise and decay of so many successive civilizations as this view would imply; for the opinion is now gaining ground among geologists that palæolitic men were really preglacial, and that the great gap—marked alike by a change of physical conditions and of animal life—which in Europe always separates him from his neolithic successor, was caused by the coming on and passing away of the great ice age. If the views now advanced are correct, many, perhaps most, of our existing savages are the successors of higher races; and their arts, often showing a wonderful similarity in distant continents, may have been derived from a common source among more civilized peoples.

Commerce, Religion and War.

A writer in *Fraser's Magazine* says: As a source of strength in war, commerce has been highly esteemed by many military writers; and has lately been put forward by a high authority in commercial politics as a reserve of power equal, if not superior, to the great armaments of continental nations. But in the highly artificial condition of English commerce, its absolute value may be easily overestimated. It is a reserve of power for war purposes, in common with all other property belonging to the kingdom, only so far as it represents saiable articles. English exports have a certain value in the world during peace time, but a declaration of war may alter that value considerably, and with that alteration will vary the value of all the other property in the kingdom, including labor; but, unfortunately, excluding the only articles whose reduction would alleviate the change, namely the food supplies. England is so precariously situated with respect to the daily food of our population, that the very circumstances which would lower the value of all other property in the country, would raise its price. Hence, although Britain might be able to stand a greater number of campaigns than any continental nation as far as absolute wealth is concerned, it would always be with greater discontent of the people toward the war; and the wealth might be much depreciated in value; for, beside the actual fluctuation due to war, there is the artificial system of credit by which the value of the produce actually on the high seas is discounted at once, and would appear in war time in the form not of hard money, but of unsalable stock. Religion—that is to say, Christianity—has no doubt modified the pugnacity and tempered the ambition of nations, as it has bettered the social life of individuals. Much of this effect has been sometimes ascribed to commerce; but commerce alone, especially when under the influence of free trade, fosters self-interest. It is by the competition for individual advancement that it benefits mankind at large, and it is, therefore, more likely to lead to disputes than to heal them unless checked by true religious principles. But the Christian religion, although it has been taught for nearly 2000 years, has not yet so effected the political actions of states as to justify any one state which desires to preserve its independence in dispensing with armed force. The strongest advocates of peace do not, indeed, propose so great a step; they allow that any nation blessed with independence must do all it can to preserve it. Some of them go further, and distinguish between just and unjust wars. As we have seen during the last year, some peaceful, thoughtful, and religious Englishmen have thought it justifiable to preach a new crusade against the Turks for the purpose of assisting some of their Christian subjects to liberate themselves from their yoke. But the existing generation have neither the power nor the authority to pronounce any war just or unjust; to them war is simply the ultimate court of appeal against what the appellants consider unbearable wrong. To each party in any war, whatever its origin, it appears but the defense of their independence; for the most apparently just and most purely defensive war is in the end as much a struggle for supremacy as the most ambitiously aggressive one. Therefore, those who advocate reduction of national armaments below the standard of other nations of equal rank, in the fancied interests of a pure, peaceful, defensive attitude, are really encouraging war by allowing an aggressive state to gain "the colgne of vantage," from which it will be so much the more difficult for the defensive state to dislodge it, when compelled at last to fight for its life. And that is the most peaceful system which combines with a truly defensive attitude in politics, the most efficient war armaments.

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22 Platt St., New York.

HARDWARE STORE WANTED.

I desire to purchase an established retail hardware business, Ohio and Indiana, or Western New York and Pennsylvania preferred. Address, with full particulars,
A. H. ABBEY, Olean, N. Y.

Wanted.

A young man with considerable business experience, active, energetic and of good address, desires a position as sales agent for a line of iron manufacture or other staple goods. Has excellent business habits, and is a hard worker. Acquainted with all manner of office work, and would make himself useful in that capacity when not otherwise employed.

Good references. Address **H.,**
Office of *The Iron Age,* 230 S. 4th St., Philadelphia.

SPECIAL NOTICE.

I have three patents for Dies, Machinery and Tools for making Augers and Bits, each running seventeen years; dated as follows: Dec. 19, 1865; January 31, 1866, and July 3, 1866. **There is a special claim on each of the dies.** All persons infringing on said patents will be held responsible to the extent of the law. **Russell Jennings.**
DEEP RIVER, Conn., Sept. 7, 1874.

RESIDENT BUYER.—A gentleman of more than twelve years' experience in the general hardware business, and for several years past acting as buyer of the entire stock of one of our large Eastern wholesale houses, will make arrangements to act as buyer for a few Western or Southern correspondents. Thoroughly understands the requirements of both markets, and being constantly in communication with all Eastern manufacturers, offers his services in this behalf. Best of references furnished. Address **G. U. S.,**
P. O. Box 4743, New York City.

Palmer, La Grange & Duval,

SHAWNEE, OHIO.

Furnace Builders & Mining Engineers,

Will contract for the construction of Furnaces complete and in blast, or furnish drafts, specifications and give general instructions. Will put in stoves and machinery of any description that may be required. Information for furnace locations can be obtained at our office in Shawnee, on application or by letter.

JOS. PALMER. H. LA GRANGE. B. F. DUVAL.

DROP FORGINGS.

The TRENTON VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of

Iron and Steel Drop Forgings

in quantities to order at reasonable rates.

HERMANN BOKER & CO., Proprietors, 101 & 103 Duane St., N. Y.

WANTED.—A first-class business man familiar with machinery and manufacturing, capable of handling large bodies of men, desires a responsible position. References satisfactory. Address,
IRON AND STEEL,
Care of *P. O. Box 813, Bridgeport, Conn.*

Wanted.

An engagement by a thorough and practical Engineer to superintend or construct Machinery, or would fill the position of Engineer and Janitor of public building. Has had over twenty years' experience, and can supply abundant reference as to ability and character.

Address *J. M. MILLER.*
Office of *The Iron Age,* 83 Reade St., N. Y.

Important to Manufacturers.

BISSELL, WELLES & MILLET,

Auctioneers and Commission Merchants, No. 15 Murray St., New York,

Solicit from Manufacturers and others consignments of Hardware and Cutlery for our weekly Auction Sales to the Trade, or at private sale for cash, as desired. Our facilities for moving large lines of goods are unsurpassed. Advances made if desired.

TO LET,

A Light, Handsome Office.

Possession Immediately.

HERMANN BOKER & CO., 101 Duane Street, N. Y.

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, May 30, 1877.

The events of the past week have been of considerable interest in Wall street, but in no respect of an exciting nature. To escape a burdensome taxation, the National Bank of Commerce, the largest institution of its class in the country, reduced its capital stock 50 per cent., or from ten to five millions. The event is significant as showing the effects of unwise legislation affecting financial institutions. The money market continues easy: Call loans are 2 @ 2½ per cent.; prime paper, 3 @ 4 per cent.

Gold has been steady with unimportant fluctuations, as shown in the following table:

	Highest.	Lowest.
Thursday..	107	106⅞
Friday	107	107
Saturday	107	106¾
Monday	106⅞	106⅝
Tuesday..	106¾	106⅝
Wednesday	..	...

Government bonds have been strong, although a little lower on account of the decline in gold. Since our last issue, the Treasury has called in for redemption $10,000,000 more 5-20 bonds, at the request of the Syndicate. It also gave notice that $1,000,000 gold will be sold for legal tender notes, these to be held to redeem fractional currency, which has not yet been presented for redemption, and which, it is believed, has been lost.

The stock market has been irregular and most of the time heavy, with principal dealings in Lake Shore, D., L. & W., Western Union, Pacific Mail and Michigan Central.

The bank statement shows a further important gain in the legal tender note average, and a small decrease in the specie average, the two resulting in an increase in the total reserve of $614,200. By reason of the reduction in the deposit liabilities, the surplus reserve shows a larger increase (£917,400) than the total reserve. The surplus reserve is now $18,560,950. Leaving out of account Treasury and Syndicate operations, this statement would be a guaranty of an extremely easy money market for months to come. Taking them into account, the statement cannot be accepted even as an indication of what the money market may be by midsummer. The following is a comparison of the bank averages for the past two weeks:

	May 19.	May 26.	Differences.
Loans	$255,894,700	$253,506,500	Dec.. $2,388,200
Specie	21,867,200	21,348,700	Dec.. 518,500
Legal tend's	52,437,700	53,570,400	Inc.. 1,132,700
Deposits	226,645,400	225,432,600	Dec.. 1,212,800
Circulation	16,069,900	16,069,000	Dec. 900

The foreign trade movements of the week are shown in the following tables:

IMPORTS.

For week ended May 26:

	1875.	1876.	1877.
Total for week	$9,357,343	$5,240,422	$6,782,681
Prev. reported	143,579,951	128,037,123	128,829,644
Since Jan, 1	$152,937,294	$133,277,545	$135,612,325

Included in the imports of general merchandise for the week are the following:

	Quant.	Value.
Anvils	205	$1,875
Brass goods	5	628
Bronzes	11	1,530
Chains and anchors	29	1,274
Copper		266
Cutlery	48	17,809
Guns	64	9,171
Hardware	22	3,784
Iron, pig, tons	130	1,897
Iron, sheet, tons	24	2,386
Iron, ore, tons	350	957
Iron, other tons	1,571	39,274
Lead, pigs	6,405	39,705
Metal goods	161	13,650
Nails	20	716
Needles	20	11,554
Old metal		434
Plated Ware	1	160
Per. caps	2	276
Saddlery	2	136
Steel	2,840	21,704
Silverware	7	644
Tin, boxes	10,665	58,735
Tin, 2002 slabs	135,290	21,012
Wire	823	5,611
Zinc	169,953	9,299

EXPORTS EXCLUSIVE OF SPECIE.

For week ended May 29:

	1875.	1876.	1877.
For the week	$4,268,064	$5,224,430	$4,827,590
Prev. reported	95,302,332	96,744,561	108,830,921
Since Jan. 1	$99,570,396	$101,968,991	$113,658,511

EXPORTS OF SPECIE.

For week ended May 26:

Total for the week	$3,170,720
Previously reported	11,626,554
Total since Jan. 1, 1877	$14,797,274
Same time in 1876	24,199,017
Same time in 1875	33,474,344
Same time in 1874	21,099,781
Same time in 1873	20,314,817
Same time in 1872	22,474,197

As there was no business done to-day in any of the boards, we omit our usual tables of stocks and bonds.

GENERAL HARDWARE.

During the week little that is worthy of mention has transpired in the trade; business continues seasonably quiet. The regular monthly meeting of the United Lock Association will be held at the New Haven Hotel, New Haven, Conn., on Tuesday next, June 5.

H. E. Russell 2d, secretary of the Russell & Erwin Manufacturing Co., sailed in the Bothnia to-day (Wednesday), on a business trip for the company to England and the continent.

The demand for Nails is fair. We quote 10d. to 60d., $2·50, net; orders for 200 kegs and over would be accepted at a slight concession from the above mentioned price.

The American Machine Company, of Philadelphia, have placed on the market a new Fluting Machine, which they style the "Eagle." This machine, which is a marvel of cheapness, is handsomely illustrated in their advertisement on the 17th page. In a circular regarding it, they say: "To meet the popular demand of a Fluter that combines the great practical advantages of a machine having corrugated rolls with the cheapness of the Hand Fluter, we now offer the 'Eagle' Fluting Machine to the trade, feeling convinced it will fully meet this want. The machine has smaller rolls and is lighter than the 'Crown' (hence its lower price), but it will turn out quite as good work, and for moderate use do equally as good service."

It will be seen by the following circular that they have also reduced the price of their "Crown" Fluting Machines:

Office of the AMERICAN MACHINE COMPANY,
No. 430 WALNUT STREET,
PHILADELPHIA, May 21, 1877.

To the Trade: Until further notice the wholesale price list of Fluting Machines manufactured by this company will be as follows:

Crown Fluting Machines.

4½ inch (length of rolls)	each, $2·50
6 " "	" 3·00
8 " "	" 4·25

Furnished with either No. 10, 12, 15, 18, 22, 26 or 30 Rolls, each machine packed in a box, with tong, heaters, etc.

Eagle Fluting Machines.

3½ inch (length of Rolls)	per doz. $18·00
5½ " "	" 24·00

Furnished with either No. 15 or 18 Rolls, each machine packed in a box, with a clamp, heaters, etc., and crated in packages of half a dozen boxes.

The following discount will be allowed on the above list to parties who do not cut prices: On purchases amounting to $250 during one year, 10 per cent. Terms: Cash, 30 days, or 2½ per cent. off for spot cash. Respectfully,

H. ALBRECHT, General Agent.

N. B.—This list supersedes previous quotations.

Graham & Haines, No. 113 Chambers street, have been appointed sole agents for Kellam's patent adjustable Window Screens. In their circular they say: "These Screens are all made with walnut frames, are adapted to all sized windows, will shove up or down the same as a window sash, and can be used at the top or bottom of the window; requires no fastenings, as it adjusts itself; concealed springs make it self-adjustable and self-sustaining at all points. The popularity of these goods is based solely upon merit as a perfect guard against flies, mosquitos, and other insects, and the low prices at which these goods are sold render their use almost universal. It is cheaper to keep the flies out of the house than it is to clean the paint, to say nothing of the comfort secured." They are packed one dozen in a case, and are sold at the following list, which is subject to discount 30 per cent. to regular trade.

Size.	Plain Wire, Green or Drab. Each.	Figured. Each.	Landscape. Each.
No. 0, 26x32	$2·00	$2·40	$3·25
" 1, 24x34	2·00	2·40	3·25
" 2, 26x36	2·25	2·75	3·75
" 3, 28x38	2·50	3·00	4·15
" 4, 32x40	2·75	3·40	4·75
" 5, 34x42	3·00	3·75	5·25
" 6, 36x44	3·25	4·00	5·75

Fernald & Sise, No. 100 Chambers street, have been appointed agents for the Auburn Tool Company, of Auburn, N. Y. They will carry in stock a full assortment of their Planes, Plane Irons, &c., and will fill orders either from store or factory at manufacturers' best terms. They also inform us that they offer from stock a full assortment of Mann's patent Metallic Sieves at factory prices.

The Douglas Axe Manufacturing Company have issued a circular under date of 15th inst., in which they say: "On and after June 1, 1877, the price of Hunt's Axes will be $10 per dozen for plain, and $10·50 per dozen for beveled Axes. At the end of the season a rebate of $1 per dozen will be allowed to parties who have not sold the goods at less than the above figures, with a discount of not more than two per cent. for cash." The New York office of the company is with W. M. Caldwell, No. 102 Chambers street.

The Chalfant Manufacturing Company, of Philadelphia, claim some special features of improvement in the Mrs. Potts Cold Handle Sad Iron, as will be seen by reference to their advertisement on page 18.

Lovegrove & Co., No. 121 South Fourth street, Philadelphia, present in their advertisement on the 18th page an illustration of a new patent Ice Pick, styled "The Gem," manufactured by them. The operation of this Ice Pick is simple and effective. The Pick is placed in position on the ice at the point to be broken, when a slight blow is struck on the Pick by the movable oblong weight which plays loose and free upon the spindle. A very slight blow is all that is required, and the ice can be broken to such size as is desired, without loss or waste. These Picks are made in two styles—plain and bronzed and galvanized.

The Derby Silver Company, Derby, Conn., have issued a handsome catalogue and price list of their specialties, in which they illustrate a large assortment of Silver plated Ware, including Spoons and Forks, Steel Handled Knives, Nut Cracks, Napkin Rings, Plated Cups, Call Bells, Casters, Cake Baskets, Butter Dishes, &c.

Frank Dayton, formerly with the Chas. Parker Co., No. 97 Chambers street, has removed to Portland, Oregon, where he has decided to establish his future home. In connection with Robert F. Hall he will, on or about the 1st proximo, commence a General Hardware business in that city, under the style of Dayton & Hall.

BRITISH IRON MARKET.

(*Specially reported by cable for The Iron Age.*)

WEDNESDAY, May 30, 1877.

Scotch Pig.—The market is quiet, and prices weaker. The following are makers' quotations:

Coltness No. 1	67/6
Glengarnock No. 1	60/
Eglinton No. 1	55/6

Manufactured Iron.—There is nothing new to report.

Rails.—There is an improving demand, and a large business doing. Prices are firmer.

IRON.

American Pig.—The market shows the same dullness that has characterized it for some time. Producers allege that prices are now below the cost of production, and that they must advance, but consumers show no eagerness to buy, and it is impossible to induce any speculative feeling. Prices seem to have weakened a little, and good buyers can obtain considerable concessions from most of the companies, either in terms or price. The Thomas Iron Company report 1000 tons Gray Forge at $17; 400 tons No. 2 Foundry at $18; 400 tons No. 1 Foundry at $19. We quote: No. 1 Foundry, $18 @ $19; No. 2 Foundry, $17 @ $18; Gray Forge, $16 @ $17.

Scotch Pig.—There is very little doing, sales being all of a retail character and not worth reporting. We quote: Glengarnock, $27; Eglinton, $25; Coltness, $28·50.

Rails.—We note the sale of 1000 tons Steel at New York, on private terms. We quote: Steel $45 @ $47 at mill, and Iron, $33 @ $36.

Old Rails.—We note the sale of 1000 tons on private terms. We quote $19 as the market rate.

Scrap.—One hundred and fifty tons No. 1 Wrought Scrap sold at $24, from yard, which is the market rate.

METALS.

Copper.—The week has been a dull one, sales not exceeding 300,000 pounds. Lake Superior at 19c. @ 19¼c., which is also the closing figure. Nothing has transpired in "futures," for which 19¼c. is offered, but in vain. Baltimore we nominally quote 19¼c. The new Copper is arriving, and any unsold portion thereof goes into store on account of the low price ruling. According to the cable dispatches to hand from London, Copper there has returned to the lowest figures thus far reached this year, £76 for Best Selected, and £68. 10/ Chili bars, a decline of 10/, during the week. A fortnight ago the former stood £77. The low prices to which all metals, with the exception of Lead, have been depressed in Europe, give rise to a great many comments in commercial papers over there. The causes that may be assigned for this extraordinary depreciation are manifold, the principal one being, we presume, the exuberance of production as compared with consumption. Next thereto we have the disinclination to speculate even in articles of such a solid nature, despite the abundance of money. Finally, there is the unfortunate political outlook interwoven with everything continental, and from which, so far as Eastern affairs are concerned, even England cannot steer altogether free. Such being the elements of instability on the other side, the normal influences of current demand and supply have ceased for the time being to regulate values, and nothing bids fair to raise them once more but a curtailment of production, if such could be resolutely adopted, so far as Copper is concerned, at least in Chili. But such a curtailment on the West Coast would amount to little, if it did not reach at least 20,000 tons, and even then it would only be seriously felt after a six months had elapsed. There is still a steady demand for manufactures, which we quote 31c. for Sheathing and 32c. for Bolts and Baziers; New Yellow Metal Sheathing, 20c.; Yellow Metal Bolts, 25c.; and Nails, 20c., net cash.

Tin.—The market here is quiet without further change. We quote, in gold, large lines, as follows: Straits, 16¾c.; English Refined, 16½c.; do. common, 16c.; and Banca, 18½c. @ 19½c., all gold. On the 25th instant, London cabled Straits £70, and dull; others received telegrams since quoting it £71, while Singapore at last accounts a week ago, stood $19·75 per picul; exchange, 4/1. What we have said under the head of Copper about the general causes affecting the European metal markets, applies with special force to Tin, much less advantageously situated than the remaining metals whose uses are infinitely more varied. There indeed seems to be little prospect ahead for a lasting improvement in the value of Tin as long as production persists in steadily outrunning consumption, as has been the case during the past three years. One day we are positively assured by cable that Australian shipments are now undeniably falling off, and the next we are informed that this was a mistake, and that, on the contrary, they are on the increase once more. Meanwhile, the London stock is swelling to proportions which in former years we had no idea could ever be reached. *Tin Plates.*—This article is rather firmer under the advices of diminishing production, and we quote good fair grades 12½c., gold, per box higher, calling large lines, ordinary brands, gold, per box, as follows, at the close: Charcoal Bright, $6·62½ @ $6·75; do. Ternes, $6; Coke Tin, $5·55 @ $5·75; and do. Ternes, $5·45 @ $5·62½. By mail from Liverpool, under date 17th instant, we have the following: "The action contemplated by the makers has not yet come off, and meantime, although in some quarters higher prices are being asked, sales can only be made at the same figures as before; at the same time there is a tendency on the part of buyers to put through purchases more freely than had been the case for some time past."

Lead.—Since our last 800 tons Richmond and 200 tons Oakland sold at 5·55c., currency, and in small lots 200 tons Newark at 5⅝c. and 5¾c., currency; together 1200 tons on the spot and to arrive. Subsequent sales were limited to 50 to 75 tons in small lots at 5¾c., currency. The market closes quiet at 5¾c., currency, for Common Domestic, with few buyers. The above sales have been spread over a great many consumers, and the bulk of them are now well stocked for sixty days to come. Stock on hand 1500 tons; afloat, 2000 tons, half of which sold. Fine Lead is dull, too, at 5¼c., currency, at St. Louis; freight thence to New York, 50c. Foreign Lead is quiet and nominal, the European markets having become a little unsettled once more. The latest cable dispatch to hand from London bears the date May 23, when Spanish Lead was worth £20. 17/6, cost freight and insurance. Mail accounts have reached us from the same quarter, dated May 17, and reading as follows: "Spanish Pig for export now costs more than English, as large quantities have been contracted for for home consumption. The English smelters are also firm, and many of them have sold their make some way ahead. Prices are: Spanish Pig, £21; English Pig, £21. 10/, usual terms." Manufactures of Lead are in tolerably steady request; Bar at 7¾c., Pipe at 9c., and Sheet at 9½c., less the usual discount.

Spelter and Zinc.—Domestic Spelter is weak at New York, and selling all the way from 6c. to 6¼c., currency, as to quality. Foreign is nominal at 6⅜c. @ 6½c., gold; none here, none afloat. *Sheet Zinc.*—The market is still devoid of animation at 8c. @ 8½c., gold, Mosselman, and 7⅝c. @ 7¾c., currency, Domestic.

Nickel.—Nothing of special interest can be reported in this metal, which remains quiescent within the range of $1·85 @ $2, gold, per pound.

Antimony—Had dropped to £47, at London—a low figure—since when the cable informs us that it reacted to £48. It is quite strong here at 12c., gold, in lots of a half a dozen casks each, with sales thereat.

OLD METALS, PAPER STOCK, &c.

Business in this market is very dull, and dealers are unable to dispose of any of their accumulations of stock unless by selling upon further time and at the consumers' own price. Yellow Metal, Composition, Zinc and Book Stock have declined ⅛c. a pound. Other articles continue nominally unchanged. We quote the following as the current purchasing rates:

Old Metals.—Copper, 14c. @ 15c. per lb.; Yellow Metal, 10c.; Brass, 8½c.; Composition, heavy, 12c.; Lead, solid, 4½c.; Tea Lead, 4c.; Zinc, 3½c.; Pewter, No. 1, 13c.; do., No. 2, 8c.; Spelter, 5½c., Wrought Iron, $18 per ton; Light do., $10 per ton; Stove Plate, $9 per ton; Machinery, do., $12 per ton; Burnt Iron, $4 per ton.

Rags, &c.—Canvas, Linen, 4¾c. @ 5¼c.; do. Cotton, No 1, 5½c.; No. 2, 2¼c.; White, No. 1, 4¾c.; No. 2, 3½c.; Colored, do., 2c.; Mixed, Woolen, 2c. @ 3c.; Soft, do., 5½c. @ 6c.; Gunny Bagging, 1¾c.; Jute Butts, 1¾c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 2½c.; Newspaper Stock, 2c.; Waste Paper and Scraps, 1½c.; Kentucky Bale Rope, 4c.; Oakum Junk, No. 1, 4½ @ 5c.; do. No. 2, 3c.; Tarred Shaking, 1c. @ 1½c.; Grass Rope, 3c. @ 3¼c.

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending May 29, 1877:

	Quan.	Value.
Copenhagen.		
Brass, bbls	1075	$90,250
Pistols, cs	153	108,500
Cartridges, cs	7101	216,270
Mach'y, pkgs	38	3,500
Hamburg.		
Hdw., pkgs	75	1,563
Mach'y, pkgs	16	3,246
Sew. mach., cs	1257	27,044
Copper, bars	118	12,000
Ag. imp., pkgs	69	3,284
Wash. mach, cs	12	130
Tacks, cs	11	402
Belting, cases	2	517
Clocks, cs	60	1,167
Nails, cs	50	534
Bremen.		
Ag. imp., pkgs	383	11,115
Mach'y, pkgs	11	650
Wire engines	2	8,000
Clocks, bxs	71	744
Hardware, cs	13	1,121
Belting, cs	2	900
Pumps, cs	2	100
Antwerp.		
Ag. imp., cs	14	710
Wringers, pgs	14	450
Iron rollers	3	300
Machinery, cs	4	518
Revolvers, cs	2	130
Light. rds, bx	1	25
Pig iron, tons	5	175
Hdw., pkgs	58	1,160
Iron wheels	40	250
Sandpaper, cs	1	150
Rotterdam.		
Ag. imp., pkgs	2	125
Hardware, cs	27	328
Pumps, bxs	3	410
Machinery, cs	20	1,608
Em'ry wh'ls, bx	1	100
Liverpool.		
Hardware, cs	40	2,545
Met. goods, cs	4	679
Car mtls., pgs	3	218
Ag. imp., pkgs	44	1,120
Em'ry wh'ls, cs	1	300
Cop. ore, bbls	216	5,000
L'mp g'ds, pgs	31	1,450
Machinery, cs	11	1,936
Clocks, bxs	18	1,204
Tinware, cs	25	472
Iron rolls, cs	1	125
Pistols, bxs	2	900
Bristol.		
Mach'y, pkgs	3	495
Hardware, cs	2	50
Hull.		
Mach'y, pgs	31	18,140
Plated ware, cs	6	707
Hdw., cs	63	2,229
Ag. imp., pkgs	68	5,110
Mf. iron, pkgs	14	244
Glasgow.		
Ag. imp., pkgs	48	1,962
Clocks, bxs	36	853
Hardware, cs	9	760
Iron rolls, cs	11	1,300
British North American Colonies.		
Coal, tons	413	1,236
Hdw., pkgs	28	1,025
Iron sheets	424	258
British West Indies.		
Nails, kegs	86	262
Car mtls., pgs	16	230
Clocks, bxs	10	137
Hdw., pkgs	110	1,470
Lamps, pkgs	8	121
Cutlery, cs	2	272
Mf. iron, pkgs	10	133
New Zealand.		
Car'ge mtl, pgs	38	1,402
Lamps, pkgs	4	228
Nails, cs	46	1,467
Hdw., cs	61	1,109
Machinery, cs	9	625
Ag. imp., pgs	24	640
Havre.		
Copper, cks	90	$22,500
Ag. imp., pkgs	102	11,150
Mach'y, pkgs	6	250
Light. rods, cs	13	600
Cadiz.		
Sew. mach., cs	12	504
Hardware, cs	29	517
French West Indies.		
Safe	1	152
Cuba.		
Hdw., pkgs	47	1,131
Clocks, pkgs	39	606
Ag. imp., pkgs	8	481
Pi'd ware, cks	5	411
Sew. mach., cs	99	2,740
Wire mat's, cs	2	228
Coal, tons	922	2,897
Mf. iron, pkgs	22	368
R. R. cars	7	3,362
Machinery, cs	11	520
Nails, kegs	100	300
Iron safe	1	110
Car wh'ls, prs	24	600
Porto Rico.		
Mf. iron, pkgs	49	333
Hdw., pkgs	33	732
Ag. imp., pkgs	11	168
Sew. mach., cs	36	613
Clocks, cs	24	110
Car. mtl., pgs	14	104
Coal, tons	21	117
Tinware, cs	4	90
Nails, kegs	187	407
Africa.		
Clocks	120	275
Hayti.		
Tanks	12	189
Nails, kegs	10	33
Mach'y, pgs	8	385
Nails, kegs	63	218
Mf. iron, pkgs	164	145
Sew. mach., cs	5	166
Hdw., pkgs	35	932
Iron, bdls	30	218
Central America.		
Shot, kegs	2	50
Iron, pkgs	56	271
Cutlery, pkgs	39	1,212
Hdw., cs	101	1,722
Mf. iron, pkgs	127	452
Mach'y, cs	6	383
Tin, bxs	20	190
Nails, cs	3	55
Lamps, pkgs	3	79
Tinware, cs	19	516
Sew. mach., cs	6	126
Ag. imp., pkgs	9	88
Nails, kegs	63	241
Venezuela.		
Hdw., cs	68	952
Sew. mach., cs	34	607
Mach'y, pkgs	55	651
Argentine Republic.		
Revolvers, cs	2	630
Sew. mach., cs	34	836
Ag. imp., pkgs	148	2,157
Burners, cs	2	200
Pumps, pkgs	2	107
Pl'ted ware, cs	4	548
Irons, cks	24	434
Lamps, cks	24	460
Mf. iron, pkgs	6	149
Hardware, pgs	140	3,081
Nails, kegs	50	125
Brazil.		
Brasses, bxs	3	460
Lamp g'ds, pgs	66	1,080
Nails, kegs	94	260
Mf. iron, pkgs	390	4,094
Sew. mach., cs	57	1,293
Brit. ware, pgs	18	3,821
Springs, bxs	19	890
Iron wh'ls, prs	105	2,150
Clocks, pkgs	78	1,717
Cutlery, pgs	110	2,481
Tinware, cs	3	106
Tanks	3	60
Hardware, cs	39	810
Mach'y, pkgs	15	600
Pumps, pkgs	6	190
Iron safe	1	50
W'lbarws, pgs	51	205
Ag. imp., pkgs	28	471

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending May 29, 1877:

Hardware.

Burkinshaw W. C., cases, 2
Boker Hermann & Co., Packages, 4
Brochner & Evans, Netting bdls., 280; Staples cks., 2
Eaton E. E., Cases, 3.
Frasse O. A. & Co., Casks, 1
Folsom H. & D., Arms, cs., 5.
Friedmann & Lauterjung, Mds., pkgs., 3,
Laughland & Co., Wire pkgs., 58
Loeb & Co., Cotton ties, cs., 1
Moore's J. P. Sons, Per. caps, cs., 3.
Morris L. H., Cases, 1.
Moulson John, Casks 13.
McCoy, Mds., pkgs., 7
Schuyler, Hartley & Graham, Guns, cs., 9
Schoverling & Daly, Per. caps, cs., 2. Cartridge cs., empty cs., 3; Mds., pkgs., 1.
Sawyer John, Wire rope, reels, 2
Ward Asline, Casks, 3
Wiebusch & Hilger Hdw. Co., Packages, 16
Wolffe H. & Co., Cases 1.
Wilson, H. D., Per. caps, cs., 4
Order, Casks, 5; Cases, 1; Per. caps, cs., 2; Wire, cs., 6; Wire, cks., 1; Anvils, 100; Chains, cks., 5.

Iron.

Currie W. & F. P. & Co., Pig, tons, 100.
Hopkins M. C., Spiegel, kilos 301,200
Hopkins E. T., Spiegel, kilos, 1 Bundles, 154
Marvel W. D., Ore, tons, 250
Naylor & Co., Bars, 4719
Phelps, Dodge & Co., Bundles, 161
Winn & Holland, Pig, tons, 200
Yates & Posterfield, Pig, tons, 18
Order, Sheet, bxs., 39; Pig, tons, 200

Steel.

Brown William, Bundles, 158; Cases, 18
Cortis R. J., Cases, 2
Prosser Thomas & Son, Tire forgings, 40; Bundles, 3
Sanderson G. & Co., Bundles, 21
Sulzbacher, Hyman & Wolfe, Packages, 56; Cases, 3; Bundles, 30; Bars, 356.
Woodford W. O., Cases, 18
Order, Rods, bdls., 43; Bundles, 98; Cases, 19; Casks, 5; Boxes, 1

Metals.

Cortis R. J., Tin, bxs., 451; Tin, ingots, 225
Hopkins E. T., Tin plates, bxs., 2782
Knoblauch & Litchenstein, Tin, slabs, 1292
Leina De D. A., Scrap copper, bbls., 1; Scrap brass, bbls., 1
Merchants' Bank of Canada, Iron slabs, 666
Naylor & Co., Tin plates, bxs., 3479
Phelps, Dodge & Co., Tin plates, bxs., 1021
Sellew R. & Co., Tin plates, bxs., 1185
Wheeler & Co., Lead, pigs, 100
Order, Tin, slabs, 240; Tin and terne plates, bxs., 855; Tin plates, bxs., 6541; Black taggers, bxs., 100; Spelter plates, 2006
Without Bills of Lading, Tin slabs, 1922; Lead, pigs, 200; Antimony, cks., 17; Tin, ingots, 473

COAL.

The auction sales upon Tuesday showed a decline so large as to take by surprise even those who had expected a considerable fall in price. The fifty cent rise in price which was to take place the first of June has made its appearance, but, unfortunately for the producers and companies, it has a minus sign before it, and the effect upon the price obtained is not altogether desirable. The following figures, showing the results of the sale, are kindly furnished us by Mr. F. E. Saward. The Pennsylvania Coal Company sold 70,000 tons of Coal May 29 at auction, deliverable at Newburg, N. Y. The following show the prices obtained and amounts sold. The Coal is all deliverable before the 15th of June:

	Sold at	Average.
10,000 tons Lump	$2·75	....
7,600 tons Steamer	2·75	....
10,225 tons Grate	2·67½	....
1,300 tons Grate	2·72½	$2·69
250 tons Grate	2·80	....
9,450 tons Egg	2·80	....
29,200 tons Stove	2·77½	....
1,675 tons Chestnut	2·80	....
6,000 tons Chestnut	2·67½	2·70½
2,000 tons Pea	2·30	....

The auction sale by the Delaware, Lackawanna and Western Railroad Company took place at noon upon the same day, at which 150,000 tons of Scranton Coal were offered, deliverable at the company's coal wharf at Hoboken, N. J., during the month of June:

	Sold at	Average.
15,000 tons Steamer	$2·42½ @ $2·52½	$2·50
40,000 tons Grate	2·37½ @ 2·42½	2·39½
25,000 tons Egg	2·50 @ 2·52½	2·51
50,000 tons Stove	2·70 @ 2·72½	2·70½
20,000 tons Chestnut	2·27½ @ 2·40	2·38

For the purpose of comparison and reference, we give herewith the average prices obtained at the sale held by the D. L. & W. Co. on April 25:

Lump		Egg	$2·95
Steamer	$2·96	Stove	3·35
Grate	2·82½	Chestnut	3·00

It was reported that immediately after the result of the above sale became known, the Delaware and Hudson Canal Company issued a circular offering their Coal at the following rates, deliverable at Rondout: Furnace Lump, $2·50; Steamer Lump, $2·50; Grate, $2·60; Egg, $2·60; Stove, $2·70; Chestnut, $2·60.

The Lehigh prices will not be issued in the form of a circular this month. At a meeting held on Tuesday for the purpose of arranging prices, the following were determined upon for Lehigh Coals: Lump, $3·25; Egg, Broken, and Stove, $2·85; Chestnut, $2·75. The market is so unsettled that the quotations can hardly be considered as any indication of the prices obtained for Coal; we therefore omit our tables.

PHILADELPHIA.

Office of *The Iron Age*, 220 South Fourth St.,
PHILADELPHIA, May 29, 1877.

Pig Iron.—The market throughout the week has been dull and heavy, and prices are again weaker. There is a disposition in many quarters to force sales up to their full capacity for production, but it appears this cannot be done without still further breaking prices. The majority of the furnaces are sold close up, and, in the case of one company, orders are on hand for 20,000 tons for future delivery. Notwithstanding these facts there appears to be no confidence in values, and the market is utterly stagnant, and any sales out of the usual routine have to be at marked concessions from quotations. Some 4000 to 5000 tons have changed hands during the week, and while in many instances full quotations have been realized others were at from 25c. to 50c. reduction. Certain brands are wanted for certain purposes, and for these full prices can be obtained, while

others are difficult to sell even at comparatively low prices. The action of the Glendon Company some weeks ago, has at last forced prices of other brands to a lower basis, and good Forge Irons can now be bought at $16·75 and less. There is a firm determination on the part of buyers not to anticipate their wants, and we, therefore, quote the market very dull at the following prices: No. 1 Foundry, $19; No. 2 ditto, $17·50 to $18; Gray Forge, $16·50 to $18. There are a few special brands of No. 1 Foundry, which still command 50c. to $1 beyond quotations, while in other cases a similar reduction has to be made to secure buyers. The whole range for No. 1 Foundry may be quoted $18 to $20 50 as to brand.

Blooms.—The market is dull and weak at about the following quotations: Sunken Scrap Blooms (2464 lbs.), $43 to $45; Northern Ore Blooms (2240 lbs.), $38 to $42; best quality Charcoal Billets (2240), for wire and steel purpposes, $52·50 to $55; Bars, ditto, $65 to $67·50; Sheet Iron Blooms, cornered (2464 lbs.), $65 to $67; Cold-blast Charcoal Plate Blooms, $57·50 to $60; run out Anthracite, $50 to $52·50.

Manufactured Iron.—We find no improvement in any department of the trade, and at this season no immediate improvement can be expected. Hopes are expressed that the fall trade will be better, but many well informed persons have apprehensions of serious difficulties if the depression continues much longer. Losses have been so continuous, with no opportunity of retrieving them, that it is felt the Iron trade is now in a very critical condition, and if the fall trade does not show some improvement upon the present condition of affairs, the position will be very serious. This refers to nearly every department of the trade, as all are alike depressed, and if some are doing more business than others, the financial result is said to be much the same—standing or working, there is no money being made. The meeting of the Wrought Iron Pipe manufacturers last week was adjourned until June; nothing of importance can be reported in the meantime. There is some activity in this branch of business, as also in the Cast Iron Pipe trade, but, as in other departments, prices are cut very low.

Bars.—The demand is about the same as for some time past for small lots, and the aggregate business is light and unsatisfactory. Inquiries are continuous, from which it would seem that there is a disposition to buy, but very little business appears to result. Reports from the interior show a more active demand, but so far as the seaboard is concerned, things are unusually dull, with nothing to indicate a change for the better. We quote Common Bars at 1·75c. to 1·90c., and Best Refined at 2c. to 2·10c.

Plate and Tank Iron.—The demand is moderately active, but we do not hear of any large orders being placed. Some of the mills are well supplied with orders, while others are rapidly working their contracts down, and still others complain of no business offering worthy of serious consideration. The boiler makers are said to be using a good deal of Iron just now, as also the ship and car builders, but we regret to say that in many departments, especially in the shipyards, there are very few new orders coming in. We are glad to note an exception at the Harlin & Hollingsworth Company, at Wilmington, who have just closed a contract for another large iron steamer for the Morgan Line, of New York. With this exception, we hear of no new business of importance, and prospects are not quite as bright as some weeks ago. We quote Tank Iron, 2½c. to 2¾c.; Common Plates, 2½c.; Shell Iron, 3c.; Flange Iron, 4c. to 4½c.

Sheet Iron.—There is a slight improvement in the demand, but nothing better as to price. The mills are now all working full time, double turn, with a fair amount of orders on hand, and prospects of full employment for some weeks to come. We quote Common American, No. 6 to 17, 2¾c. to 3c.; No. 18 to 28, 3¼c. to 3½c. Best Charcoal Bloom, No. 6 to 20, 5¼c.; No. 22 to 28, 5¾c. to 6c. Philadelphia Russia, 8c.

Skelp Iron.—Orders for about 1500 tons have been placed recently, but at prices said to be materially lower than quotations. We quote city prices of Skelp, 2·12½c. to 2·37½c.

Muck Bars.—No new business to report. We quote the nominal rate, for Philadelphia delivery, $34·50 to $37.

Steel Rails.—Business continues dull and depressed, with a very weak feeling as regards prices. There are no cash buyers in the market for large lots, so that prices are nominally unchanged, and the few odd lots taken are chiefly on the basis of $47 to $48, at mills. Buyers might easily be found if sellers would take bonds or give long time, but they adhere to cash or short time transactions; hence the actual amount of new business passing is unimportant. None of the mills, however, are in immediate need of business, and a full summer's work appears certain, as the contracts on hand, with the usual small orders dropping in from time to time, will keep them fully employed for the next two or three months. Cash buyers for large lots would no doubt obtain liberal concessions from the quoted rates, but, so far as we can learn, nothing has been done at less, and no offers made; we therefore quote as before, $47 to $48, at mills.

Iron Rails.—There is no business doing of any importance, although as usual buyers are looking round and seeking to place their orders. The difficulty so frequently noticed still prevails—sellers want what buyers, as a rule, cannot offer, viz., cash; hence a large proportion of the inquiries do not result in actual business. A few small lots change hands occasionally at figures within the range of our quotations. Sales within the week amount to about a 1000 tons. In one instance a sale of 30 pound sections is reported at a much higher price, but a fair average quotation would be $33 to $36 at mills, according to quality and terms of payment.

Old Rails.—Business for the past two weeks has been unusually light, although prices are about the same. The demand for common Rails has dropped off, but extra quality can be placed in lots of 100 or 200 tons at $21 to $21·50, at which some sales are reported. We quote ordinary Rails $20 to $20·50; extra quality $21 to $21·50; street Rails $23.

Old Car Wheels.—Sales of 90 tons extra quality are reported at $20, with $19 to $19·50 bid for two other lots. As covering the whole market, we quote $18 to $20, according to make.

Old Car Axles.—Buyers are indifferent at the outside figures, while holders are firm. Sales are reported at $30, Western delivery. We quote the market quiet, $29 to $30.

Scrap Iron.—A fair business is doing within the range of our quotations, usually at inside figures—say, Cast, $15 to $17; Wrought, $23 to $25.

Nails.—The market still continues in a completely demoralized condition, and although $2·60 is the nominal quotation, we hear of sales down to and below $2·25. The feeling is a trifle steadier, but prices are still very irregular.

Tin Plates.—The market continues fairly active without change in values. We quote, jobbing lots: I. C., 10x14, Best Charcoal Bright, $7·50 to $8; I. X., 10x14, $9·75 to $10·25; Best Charcoal Leaded, 28x20, $14 to $14·50; good Charcoal Leaded, $13·50 to $13·75; other good brands, $12·50 to $13·25; good Bright Tin for Cans, &c., $6·50 to $7·25; Coke Leaded, 14x20, $6 to $6·50.

Lead.—Foreign Pig has been arriving in quite large quantities of late; almost all of it was previously ordered. We quote, nominally, at 6¾c. gold. Domestic, mostly Common, has been sold by some large holders to the extent of about 1500 tons recently, at $5·50 to $5·67½, currency. This was sold mostly, if not all, to consumers, somewhat in advance of their actual necessities. Manufactured is firm and in good demand at the old quotations: Sheet, 9½c.; Pipe, 9c.; and Bar, 7¾c, less 10 per cent. to the trade.

Shot.—Drop Shot, 25 lb. bags, 9½c.; do., 5 lb. bags, 10½c.; Buckshot, 25 lb. bags, 10½c.; do., 5 lb. bags, 11½c.; Conical Balls, 25 lb. bags, 10c. per lb., net; Bar Lead, 5 oz., 1/8 lb. and 1 lb. Bars, 7¾c., less 10 per cent. to the trade.

Old Metals.—Market steady at following quotations: Heavy Old Copper, 17c.; Light Tinned Copper, 15½c.; Copper Bottoms, 15c.; Heavy Red Brass, 13c.; Heavy Yellow Brass, 10c.; Heavy Clean Pipe Lead, 5c.; Junk Lead, 5¼c.; Tea Lead, Light Paper, 5½c.; Tea Lead, Heavy Paper, 5c.; New Zinc Clippings, 4½c.; Old Sheet Zinc, 4c.; Yellow Brass Turnings, 9c; Plumbers' Lead Joints, 6c.

PITTSBURGH.

Office of *The Iron Age*, 77 Fourth Avenue, PITTSBURGH, May —, 1877.

Owing to the National holiday our weekly review of the Pittsburgh market has failed to reach us up to the hour of going to press.

BOSTON.

MAY 26.—*Pig* continues depressed, with foundrymen purchasing from hand-to-mouth. Scotch Pig is firm, but very dull. We quote $27 to $30 for store lots, these being the best figures that could be actually obtained. The foreign markets are not quite so firm. *Bar* is dull, quoting $46 to $47 for Refined, and $37 to $38 for Common. Nails are in light demand at the reduction. *Copper* has been fairly active, with sales of nearly 400,000 lbs. at 19c. to 19¼c. New copper will be on the market next week. For Manufactured we quote: New Sheathing, 30c. to 31c.; Bolts and Braziers, 31c. to 31½c.; Yellow Metal Bolts, 25c. to 25¾c.; ditto Sheathing, 20c. to 20½c. *Lead* is easy, with a small demand. We quote: Pig, 5¾c. to 6c., currency, for Domestic; Sheet, 9½c.; Pipe, 9c.; Tin Lined Pipe, 16½c.; Bar Lead, 8¾c. to 9c., less usual trade or 10 per cent. discount. *Antimony* is quiet at 12c. to 12½c., gold, for Boston spot lots, with a decline in London to £48, and *Spelter* is easy, closing at $6·25 on the spot for 10 ton lots. *Tin* is quiet, and prices rather tend downward. The foreign markets are reported firmer by cable. We quote: Straits, 16¾c. to 17c.; Banca, 19¼c. to 19¾c.; Refined English, 16½c. to 17c., gold. We quote Plates: Charcoal I. C., $7 to $7·50; Coke, $6·10 to $6·25; and Terne at $6·75 to $7·25, gold.—*Commercial Bulletin.*

ST. LOUIS.

Specially reported by Messrs. SPOONER & COLLINS, Iron commission merchants, 217 North Third street, St. Louis, under date of May 24: No material change is noticed in the condition of our market since last report. Demand is very high and prices unchanged. Our mills and foundries are running very light and have good stocks on hand. We see no present prospect for an advance in prices till late in the fall or next spring. We quote same as last:

	No. 1.	No. 2.	Mill.	White and Mot l'd
Missouri Stone Coal	$25·00	$23·00	$22·00	$21·00
Missouri Charcoal	23·00	22·50	22·00	20·00
Tennessee Charcoal	23·00	22·50	22·00	20·00
Tenn. Coke, very soft and strong	25·00	23·00	22·00	22·00
Hanging Rock Charcoal	26·00	24·50	23·50	....
H. R. Charcoal, Cold-short	25·00	24·00	....	....
	Extra No. 1.	No. 1.	B. No. 1.	No. 2.
Alice H. R. Coke	25·50	25·00	24·50	23·00
Quinnimont, West Virginia, Coke	25·00	24·00	23·50	22·50

COLD BLAST CHARCOAL—All Numbers.

Hanging Rock	$25·00 @ 40·00—4 mos.
Tennessee	28·00 @ 30·00—4 mos.
Kentucky	28·00 @ 30·00—4 mos.
Missouri	28·00 @ 30·00—4 mos.
Georgia	28·00 @ 30·00—4 mos.
Alabama	28·00 @ 30·00—4 mos.
Assorted Bar Iron	@ 2 1-10 rates.
No. 1 Wrought Scrap	·90 @
No. 1 Railroad	1·00 @
Machinery Cast "	·80 @
Light Cast "	·55 @
Old Rails	19·50 @ 20·00—4 mos.
Old Car Wheels	18·00 @ 19·00—4 mos.

CINCINNATI.

Messrs. L. R. HULL & Co., under date of May 26, write us as follows: PIG IRON.—There are no special features of interest to report of the market during the past week. The demand for either foundry or mill iron has not varied to any appreciable extent, and prices generally range about the same, with no prospect at present of any important changes:

HOT-BLAST FOUNDRY.

Hanging Rock No. 1, Charcoal ₩ ton.	$24·50 @ 25·00—4 mos.
Hanging Rock No. 2, Charcoal	22·50 @ 23·00—4 mos.
" No. 1, Coke	24·00 @ 24·50—4 mos.
" No. 2, "	22·00 @ 24·00—4 mos.
" No. 1, Stonecoal	22·00 @ 23·00—4 mos.
Virginia No. 1, Coke	23·00 @ 24·00—4 mos.
" No. 2, "	21·50 @ 22·50—4 mos.
Ala. and Tenn., No. 1, Charc'l	23·50 @ 24·00—4 mos.
" " No. 2, "	22·00 @ 22·50—4 mos.
Red-short, No. 1, Coke	25·00 @ 25·50—4 mos.
Fannie U. S. Scotch, No. 1	23·50 @ —4 mos.
Alice " No. 1	25·00 @ —4 mos.
Am. Scotch, No. 1	22·00 @ 22·50—4 mos.

FORGE IRONS.

Hanging Rock No. 1, Charcoal ₩ ton.	$22·00 @ 22·50—4 mos.
Hanging Rock No. 1, Coke	21·00 @ 21·50—4 mos.
Virginia, No. 1	20·50 @ 21·00—4 mos.
Ala. and Tenn., No. 1, Charc'l	20·50 @ 22·00—4 mos.
Red-short, No. 1, Coke	22·00 @ 23·00—4 mos.
Cold-short, No. 1, Stonecoal	19·00 @ 20·00—4 mos.

CAR WHEEL AND MALLEABLE.

Hanging Rock ₩ ton.	$40·00 @ —4 mos.
Southern and Western Brands	30·00 @ 35·00—4 mos.

ORE.

Lake Superior	$8·50 @ —cash.
Virginia Hematite (Washed)	4·50 @ —cash.

BALTIMORE.

Messrs. WYETH & BROTHER, Iron and Steel merchants, 46 and 48 South Charles street, report us the following prices, under date of May 28: Trade for the past week rules much as reported for some time past, dull and unsatisfactory, with margins cut down to about cost of production, placing both the manufacturer and dealer in the position of doing business without profit:

AMERICAN REFINED BAR IRON.

1 to 6 wide by ⅜ to 1 thick.. } 1 to 4½ wide by 1⅛ to 2 thick }	1·93 to 2c. ₩ lb
Round and square, ordinary sizes, from ⅜ to 2 inclusive	1·95 to 2c. "
Hoop Iron, 1½ wide and upward	3 to 3¼c. "
Band Iron, from 1¼ to 4 in. wide	3 to 3¼c. "
Horse Shoe Iron ⅜ to 1 wide by ⅜ to ½ thick	3¼ to 3½c. "
Norway Nail Rods	5½ to 6c. "
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes	14½ to 15c. "
Machinery Steel	8 to 9c. "
Cast Spring Steel	7½ to 8c. "
Homogeneous Steel Plate	8½ to 9c. "
Perkins' Horse Shoes, per keg of 100 lbs.	$3·92½
" Mule Shoes " "	4·92½
T. R. Spikes	2½ to 2½c.

Common Horse Nails, from 14c. to 18c. per pound.

	10	9	8	7	6	
Putnam Horse Nails	23	24	25	26	28c.	per ₩
Globe Horse Nails	23	24	25	26	28c.	per ₩

Messrs. R. C. HOFFMAN & Co., Iron and commission merchants, No. 23 South Frederick street, report the Pig Iron market as follows, under date of May 28: We have no change to note since our last report. The market continues quiet with moderate sales, and rather more inquiry for best brands of Charcoal metal. We quote:

Baltimore Charcoal	$29·00 @ 31·00
Virginia "	28·00 @ 32·00
Anthracite No. 1	20·00 @ 21·00
" No. 2	19·00 @ 20·00
" No. 3	18·00 @ 19·00
White and Mottled	16·00 @ 17·00

RICHMOND.

A Mr. ASA SNYDER, Iron merchant and furnace Agent, Richmond, Va., writes as follows under date of May 28: Quotations of Charcoal Pig Iron are unchanged. Anthracite you will please revise as follows:

Va. Cold-blast Charcoal, Cold-short	$21·00 @ 25·00
Va. Cold-blast Charcoal Neutral	30·00 @ 32·00
Anthracite, No. 1 X	21·00 @ 22·00
" No. 2 X	20·00 @ 21·00
" No. 2	19·00 @ 20·00
Coke, No. 1 X (Quinnimont)	23·00 @
" No. 2 X "	22·00 @

CHATTANOOGA.

Specially reported by S. B. LOWE, dealer in Metals, under date of May 28: There is no change to note in prices, which remain about the same:

COKE.

No. 1 Foundry, extra	$21·00 @ 21·50
No. 1 Foundry	19·50 @ 20·00
No. 2 Foundry	17·50 @ 18·00
Gray Forge	16·00 @ 16·50
White and Mottled	15·00 @ 15·50

HOT-BLAST CHARCOAL.

No. 1 Foundry, extra	$21·50 @ 22·50
No. 1 Foundry	19·50 @ 20·50
No. 2 Foundry	18·00 @ 19·00
Gray Forge	16·50 @ —
White and Mottled	16·00 @ —

COLD-BLAST CHARCOAL.

Car Wheel Metal	$22·50 @ 27·50
" " extra standard	29·50 @ 34·50
Forge Metal	17·50 @ 20·50
Muck Bar	30·50 @ 34·50
Old Car Wheels	17·00 @ —
Old Rails	16·00 @ 17·00
Brown Hematite Ore, 50 to 56 per cent. per ton	$1·75 @ 2·25
Red Fossilliferous Ore, 50 to 56 per cent. per ton	1·50 @ 1·75

LOUISVILLE.

Messrs. GEO. H. HULL & Co., under date of May 28, write us as follows: No noticeable change in the market. Consumers are disinclined to believe that there will be an advance in prices in the near future, and buy for immediate wants only at quotations:

FOUNDRY IRONS.

No. 1 Hanging Rock, Charcoal	$24·00 @ 25·00
No. 2 " "	22·00 @ 23·00
No. 1 Southern, Charcoal	22·00 @ 25·00
No. 2 " "	20·50 @ 21·00
No. 1 Hanging Rock, Stonecoal and Coke	23·00 @ 24·00
No. 2 Hanging Rock, Stonecoal and Coke	21·00 @ 22·00
No. 1 Southern, Stonecoal and Coke	21·00 @ 21·50
No. 2 " " "	20·00 @ 21·00
" American Scotch "	23·00 @ 23·50
Silver Gray	19·00 @ 21·00

MILL IRONS.

No. 1 Charcoal, Cold-short and Neut'l.	20·00 @ 21·00
No. 1 Stonecoal and Coke, Cold-short and Neutral	19·50 @ 20·50
No. 2 Stonecoal and Coke, Cold-short and Neutral	19·00 @ 19·50
No. 1 Missouri and Indiana Red-short.	24·00 @ 24·50
White and Mottled, Cold-short and Neutral	16·00 @ 17·00

CAR WHEEL AND MALLEABLE IRONS.

Hanging Rock, Cold-blast	37·00 @ 40·00
Alabama and Georgia, Cold-blast	28·00 @ 35·00
Kentucky, Cold-blast	28·00 @ 40·00

FOREIGN

FRANCE.

(Moniteur des Interets Materiels).

PARIS, May 6, 1877.—*Metals.*—With the exception of articles in demand in consequence of the war, general trade languishes, especially since the discount has also been looking up. *Copper.*—The English market has been unfavorably affected by the continued direct shipments from Chili to this country, aside from which the charters there for the last half of April being large, the late slight improvement has disappeared again, reacting on the value of the metal among us. Little has transpired here, and we are tending downward once more. We quote hill Bars, 185 francs the 100 kilos; Common do., 180; Ingots and Slabs, 190; English Best Selected, 192·50; and pure Corocoro Ore, 187·50. At Havre, on the contrary, there is a slightly improved feeling. They quote first brands Chili bars, 183·75 to 185; good current do., 181·25 to 182, and Lota and Urmeneta, 180. Marseilles remains tolerably steady; Red Tokat, 180; Small Refined Ingots, 180; Sheathing, 225; Bolts, 235, and Yellow Metal Sheathing, 205. *Tin* was, during a day or two, a little better at London, owing to cable dispatches from Australia to the effect that the shipments were momentarily lighter. Subsequently this proved a mistake, and the markets resumed their previous attitude of extreme depression. Very little has been transpiring here, but prices are, nevertheless, sustained, as follows: Banca at 192·50 francs the 100 kilos; Billiton, 188·50; Straits, 187·50; Australian, 187·50, and English, 184. The Marseilles market is quiescent at the following figures: Banca, 195; Straits and Billiton, 185, and English Refined, 195. *Lead.*—This metal, as was to be foreseen, has become the subject of speculation, resulting in a 10/ advance in England, Spanish at the same time being withdrawn from the market there as well as on the continent. We have become quite firm here, and quote French, 54 francs the 100 kilos; Spanish, 53·50; English, 53·50, and Belgian and German, 54. No particular change is reported from Marseilles, but the market there maintains its firmness. They quote first fusion, 50 to 50·50; second ditto, 49·75; Sheet and Pipe, 57, and Shot, 55. *Spelter* is without feature; whatever slight changes there are in values are against holders. We have to report but an insignificant business from here without change in rates, and repeat the following quotations: Silesian, deliverable at Havre, 53·50; other good brands, 53·50, and at Paris, 54. Havre remains steady at 54 francs the 100 kilos. Nothing new from Marseilles. *Iron.*—There is still a good deal of hesitation to buy extensively, but at present low rates this will undergo a favorable change; from time to time we hear of larger contracts now already. Thus the Eastern Railroad Company has bought 10,000 tons Steel Rails at 180 francs. Flooring Iron Sheets at Paris are also 180 francs; best quality is held at 190. In the Ardennes, Rolled Iron is worth 185; in the Meurthe-et-Moselle, affinage Pig Iron is quoted 62 to 63. It is at length announced that Messrs. Schneider & Co. will furnish the Italian navy the steel armor plates for the Duilius and Dandolo ironclad frigates, or rather monitors. In the Haute-Marne, Coke Iron is sustained at 170 to 180 francs, and Mixed, 200 to 205. *Coal.*—Many stocks held by weak speculative parties have been cleared off, and are now in strong hands. The companies for contracts after September ask 1 to 2 francs per ton more.

BELGIUM.

(Revue Universelle).

BRUSSELS, May 13, 1877.—*Iron.*—During a couple of days of the week under review there was a slight flagging in the demand for Iron; since then there has been a slightly increased animation, sufficient to keep going the reduced production of our rolling mills. There is no doubt as to the improvement which has taken place in the Iron movement in Belgium since the commencement of the year; official statistics abundantly prove it. We, of course, do not deny that what transpired embraced many old contracts, but aside therefrom quite a respectable business was transacted. Prices, unfortunately, are not sustained with the steadiness we should wish to see established. The adjudications which succeed each other still show a gradual decline. Our machine shops have now orders on hand for a couple of months to come; the tube works and plumbing material shops have also their hands full. Pig Iron is moving off in accordance with this increase of activity. The Cockerill Society have rented the Hungarian State Iron Works at Diosgyoer, Hungary, for 12 years, and engages to turn out 150,000 cwts. Steel Rails from the establishment the first year, and double the quantity the ensuing one. The Iron to be employed is to be Hungarian only, and such old Rails as the government may furnish to be used; the rent to be 11 kreutzers per cwt.; at the end of the lease the works to revert to the State without indemnity. The first five years the State takes together 500,000 cwts. Steel Rails at 6 guilders per cwt., and the company take the old Rails at 2 guilders; prices later on subject to modification. *Coal* without feature.

GERMANY.

(Borsenhalle).

HAMBURG, May 12, 1877.—*Metals.*—Matters in the metal trade of Germany gradually assume a more reassuring aspect, and although there is no room for sanguine expectations of any very great revival near at hand, it cannot be denied that the Eastern war, confined to its present belligerents, instead of doing harm, only tends to enliven activity in many metal branches administering to the wants of Russia and the principalities on the lower Danube, which we trade with through Austria and Hungary. *Copper.*—Dealings have been restricted, but without change in rates. Berlin is quiet at 76·50 to 58 marks for good qualities English and Australian the 50 kilos, and 77·50 to 78 for Refined Mansfield. English, at Stettin, is bringing 90 marks. There is no change here. We quote: Drontheim, 82 marks; Minnesota Ingots, 110; Quincy, 92; and English Tough Cake, 77 to 78 marks. *Tin* has been in better request, and there is now an improved feeling noticeable. Berlin quotes Banca 77 to 77·50 marks the 50 kilos, and English Refined, 74·50 to 75. Here and at Stettin the market is well held, without alteration in rates. *Lead*—Greater activity in the consumptive demand begins to manifest itself in the German markets. Berlin is firm at 21 to 21·50 marks the 50 kilos. Stettin is well maintained at 25·50 to 26 marks for Spanish and 22·50 to 24 for German. Our own market exhibits considerable strength at the following quotations: English Pig, 23 to 23·50; ditto Sheet, 24 to 24·50; German Pig, 22·50 to 23; and Spanish, 25 marks. *Spelter.*—There is little doing in our markets, but prices have not given way any further. At Berlin good qualities Silesian are worth 20·25 to 20·75 marks the 50 kilos. Stettin is steady at 21·50 to 22·50. Here we are nominal at 21·60 on the spot, and 21·25 marks for futures.

HOLLAND.

(Koch & Vlierboom.)

ROTTERDAM, May 15, 1877.—*Tin.*—The Netherland Trading Society will sell in this city and Amsterdam, on the 30th instant, together, 22,400 slabs Banca. The last few days the metal has been firmer in response to the English improvement, and some speculative purchases have been made of Banca Tin at 43 to 43·50 guilders, now held at 43·75. Billiton met with purchases at 42 to 42·50. Except a few operators for a rise, the general belief seems to be that prices cannot be sustained, consumption having declined to a minimum, while shipments from Australia do not seem to fall off in the least.

EAST INDIES.

(Aitken, Spence & Co.)

COLOMBO, Ceylon, April 14, 1877.—*Plumbago* is in better supply, owing to the recent rains reopening the river for traffic. There is a good inquiry, and prices are firm. We quote free on board, exchange at par, 2/ without freight, but including commission per ton: Lump, 336/; Chip, 189/, and Dust, 131/3. Freights to New York per ton, 65/; shipments to the United States from October to April 12, 45,644 cwts., against 30,690 in 1876; to England, 15,133; to Marseilles, 234, and to India and Australia, 160; together this season, 61,121 cwts. *Shipping.*—For America the Vesuvius is now loading, viâ Galle and Alleppee. She will be followed by a small vessel in May. *Exchange* closes with an upward tendency: credits, 1/9⅝; documents, 1/9¾; bank selling at 1/9¾; private demand for credits good at 1/9⅝; all at six months' sight on London.

(Gilfillan, Wood & Co.)

SINGAPORE, April 12, 1877.—*Tin* is in fair supply, and as buying for America has become less active, prices have fallen to $20·50 per picul, with a weak market. *Tonnage* is in over supply, and rates are weak. We quote, dead weight, still 40/ per ton. The Chocorua is loading for Boston. The Ettie has cleared for New York with 738 piculs tin. Shipments to the United States since January: 12,698 piculs, against 10,198, 20,097, 12,071, 8255, 15,904, 11,863, and 5693 piculs in 1876–1870. *Exchange* is unsteady at 4/⅝ per dollar, 6 months' sight credits.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(From our Regular Correspondent.)

SHEFFIELD, Eng., May 14, 1877.

WE ARE STILL POSSESSED,

not exactly of or by his satannic majesty, but by a very intense and deep-seated feeling, which may at any moment spur us on to war. There is only one power in Europe against which we should at present care to commence hostilities, and that power, I hardly need state, is Russia. It is really surprising to find how strong the dislike of the Muscovite is throughout this country, and how ready people are to speak of a renewal of the triumphs of the Crimean war as being again possible, embittered though they may be with woeful memories as to the maladministration of 1854–'55. There is a limited section of the public and of the press, however, which actually supports the arrogant and ambitious pretensions of Russia, and positively seeks to convince people that we ought to help the Czar's government to "smash up" the Ottoman empire! These views are not largely entertained, nevertheless, and I have not the slightest doubt that if the country were polled to-day, that the anti-Russian view would be found to be held by fully seven-tenths of the whole. This distrust of Russia is hereditary and inborn. People have not forgotten the Polish and Hungarian episodes. They do not lose sight of the Siberian experiences, which so quickly follow any little escapade in Russia, nor have they—and this is one of the strongest and most lasting of all the feelings now rampant in the British breast—forgotten several incidents which rendered the Crimean fighting a further record of Muscovitish treachery, for that is the title accorded to them by such historians of the period as Dr. Nolan, Dr. Russell and other competent authorities. Above all,

OUR COMMERCIAL INTERESTS

are held in view. It is fast becoming evident that if Great Britain is to remain the greatest trading nation of the world, we must be prepared now and then to assert our supremacy by force of arms, or, more especially, by our naval prowess. If we do not observe this duty we permit large sections of the world's surface to pass into the hands of hostile or ambitious powers, which not infrequently impose duties on British manufactures that in the end prove prohibitive. Thus, supposing Russia now annexes large tracts of country in Asia Minor, and obtains a further domination over Persia, would not that cut off a very considerable trade now wholly in our hands? Undoubtedly it would, and the same thing might be repeated *ad infinitum* elsewhere. Under these circumstances, then, we are quite justified in

ARMING TO THE TEETH,

so as to uphold our territorial rights immediately they may be threatened. Part of the fleet is now in the Mediterranean; the second section is proceeding to the Grecian Archipelago, and at other stations preparations are being made for sending reinforcements. Military arrangements are also in active progress, although the general public has no very definite idea as to what the actual plans of the government may be. There is an idea, of course, that we may assume an active protectorate over Egypt and proclaim an actual state of siege in Alexandria, together with a temporary occupation of Candia, but these hypotheses may, as a matter of ultimate facts, all prove to be wrong. At all events, the ministerial policy of "keeping the powder dry" is heartily and necessarily indorsed, and the concurrent activity is furnishing some extra employment to several of our industries. Whether by reason of the war panic or otherwise, I am unable to state, but there have been

SEVERAL HEAVY FAILURES

during the week, those following being the most important; namely: John Lee & Son, blanket manufacturers, Earlsheaton, near Dewsbury; liabilities, £111,000; assets, £78,000; William Blews & Sons, bell and brass founders, gas works contractors and general hardware merchants, Birmingham and Moscow; liabilities, £66,000, or from that to £80,000; assets not stated; Henry Cutler, hop merchant, &c., London; liabilities, £63,600; assets, £12,000; S. H. Mountain, hop merchant, London, &c.; liabilities, £135,000, and assets, £43,000; the Earl of Perth, a Scottish peer; liabilities, £16,000; assets, "unknown;" R. E. Nalliers, music hall proprietor, London and Margate; liabilities, £60,000; assets unascertained. The failure of Lee & Son has been brought about by the non-payment of the Turkish government for an immense quantity of blankets. That of Blews & Sons (really carried on by Mr. W. H. M. Blews) had been talked of as being likely for some days, and when it actually occurred, on May 12, people are said to have been surprised at the small amount of debts.

THE DARLASTON STEEL AND IRON COMPANY,

near Birmingham, is to be reconstructed, that step having been decided upon on May 11. The new company will have a capital of £150,000 in £10 shares, and will assume the assets and liabilities of the present concern. The secured creditors, including the debenture holders, whose total claims reach £205,000, are to receive preferential rights at the rate of 5 per cent. out of profits. The unsecured creditors are to receive new shares in discharge of their claims.

THE WRECK OF THE DAKOTA,

Guion steamer, off the Welsh coast last Thursday, was an awkward, and might have been a terrible disaster. Fortunately none of the 500 lives on board were lost, and many even saved their baggage. The vessel now lies with 35 feet of water over her taffrail at low tide, and her bow is so high on the rocks that she will probably break up as she lies. The only way in which the captain's error in reckoning can be accounted for is that there were very heavy thunderstorms all along the Welsh coast that day, and as the Dakota is entirely constructed of iron, it is supposed her compasses had become magnetized—*hanc illæ lachrymæ!*

THE CITY OF BRUSSELS,

three weeks overdue, has been the cause of great anxiety, but we learn by telegraph this morning that she was spoken last week by the City of Richmond, and was then coming along under sail—"all well." A powerful tug has been sent from Liverpool to give her a helping hand, or, at any rate, a taut bowline! Despite the awkward weather

THE TAY BRIDGE

continues to be pushed forward, a 245 feet span having last week been floated out and deposited on two piers in the southernmost gap of the structure. By the end of May it is estimated that the total length of the girders from the Dundee side will be 6337 feet, leaving only same 1100 feet of small spans and two large spans to be fixed.

BRITISH RAILWAY LOCOMOTIVES.

From statistics published by *Engineering*, I learn that the leading British lines now own locomotives respectively as follows; namely: London and Northwern, 2035; Great Western, 1456; Northeastern, 1348; Midland, 1259; Lancashire and Yorkshire, 673; Caledonian, 742; Great Northern, 564; Great Eastern, 485; North British, 460; Manchester, Sheffield and Lincolnshire, 386; London and Southwestern, 351; and the other companies various totals down to the 55 owned by the Great North of Scotland Line. The average cost of running expenses last year was 29/ per train mile; coal and coke 2/55; water, 2d., and the gross total ordinary ex-

penditure 948/ per train mile; the total of which on all lines was 202,616,174.

LABOR DISPUTES

are again becoming awkward, and some threaten to prove ruinous if persisted in. The West Lancashire miners, numbering some 30,000, will strike on the 17th inst. against a drop of 10 per cent. In Northumberland the miners to the number of 40,000 threaten to strike against the proposal to deprive them of free house coal. The Clyde shipwrights will be locked out on May 19th unless they withdraw their notices for an advance of about 15 per cent. In this case about 30,000 men are affected. The master shipbuilders arrived at the decision to resist, at a meeting held on Friday, May 11th, when 22 firms at Glasgow, Greenock, Port Glasgow and Dumbarton were represented. In the Birmingham nut and bolt trade, the Fifeshire coal trade and the Bromsgrove nail trade, disputes continue. The nailers threaten to publish their various rates of wages in all the papers of the Kingdom unless their wages are maintained at the old rate.

THE APRIL EXPORTS,

as set forth by the Board of Trade returns, just issued, are in some respects more satisfactory than those for March. The leading figures for the month are as under:

Iron—Pig iron	Tons.	83,951
Bars, angles, bolts and rods	"	21,323
Railroad of all sorts	"	32,393
Wire	"	4,028
Hoops, sheets and plates	"	13,519
Tin plates	"	13,940
Cast or wrought iron	"	23,616
Old iron	"	1,989
Unwrought steel	"	1,674
Hardware and cutlery		£261,863
Machinery—Steam engines		£134,275
Other machinery		£335,083
Brass	Cwts.	4,579
Unwrought copper	"	16,221
Wrought copper	"	14,913
Yellow metal sheathing	"	24,533
Lead	Tons.	2,859
Telegraphic wire		£ 38,237
Unwrought tin	Cwts.	11,213
Zinc or Spelter	"	6,221
Coal, coke or patent fuel	Tons.	1,358,873

Of the various articles the quantities sent to the United States were: Pig iron, 3299 tons; bars, &c., 518 tons; railroad, 199 tons; hoops, &c., 79 tons; tin plates, 9787 tons; cast iron, 183 tons; old iron, 52 tons; steel, 552 tons; hardware and cutlery, £22,858; machinery, £13,958; unwrought copper, 80 cwts.; wrought copper, 592 cwts; lead, 618 tons; and unwrought tin, 2619 cwts. The special return of

IRON AND STEEL RAILS

is as follows:

Exports of Iron and Steel Rails in the month ending April 30, 1877, compared with the exports of the corresponding period of 1876.	Quantities. Month ended April 30.		Value. Month ended April 30	
	1876. Tons.	1877. Tons.	1876. £	1877. £
Iron Rails:				
To Russia	1,024	1,078	9,269	5,987
Sweden and Norway	5,341	5,302	38,742	31,801
Germany	...	10	...	58
Spain	876	1,264	5,916	8,021
Italy	1,441	4	10,101	28
United States	....	....	....	....
Brazil	299	971	2,306	5,600
Chili	15	71	120	451
British N. America	3,505	168	24,539	1,050
British India	908	46	7,128	347
Australia	1,282	2,636	9,521	17,283
Other countries	1,737	3,887	13,699	23,338
Total	16,428	15,457	121,341	93,964
Steel Rails:				
To Russia	516	3,830	4,768	36,543
Sweden and Norway	45	920	475	8,282
Germany	749	482	7,293	4,097
Spain	....	....	....	....
Italy	29	....	352	....
United States	....	142	....	996
Brazil	....	673	....	6,056
Chili	26	....	302	....
British N. America	6,087	315	65,262	2 921
British India	51	1,284	557	9,701
Australia	250	2,775	2,540	23,850
Other countries	3,552	292	23,881	2,470
Total	11,233	10,773	115,489	91,916
Total of Iron and Steel Rails	27,663	26,230	236,771	188,880

SCOTCH PIG IRON

has been fairly steady, on the whole, and a considerable business has been transacted on shipping and general account at rates for makers' brands not materially differing from those of last week. There are now 135,359 tons in Connall's stores and 113 furnaces blowing, of which 12 are at Gartsherrie, 10 at Coltness, 6 at Glengarnock, and 16 producing Eglinton.

Messrs. James Watson & Co., Glasgow, May 11, thus report: "We have to report an irregular market for Scotch pig iron this week. On Tuesday the opening price was 55/3, but it declined same day to 54/6, cash and one month fixed; on Wednesday it improved to 54/10½ per ton, while yesterday business was done up to 55/3, closing in the afternoon at 55/ per ton. To-day the price advanced to 55/3, closing again quieter at 55/ per ton. Shipments last week were 11,915 tons, against 12,570 tons in the corresponding week of 1876." We quote:

	No. 1.	No. 3.
G. M. B., at Glasgow	56/6	53/
Gartsherrie, "	65/	56/6
Coltness, "	68/6	56/6
Summerlee, "	60/6	54/6
Langloan, "	63/6	56/6
Carnbroe, "	58/	54/
Calder, at Port Dundas	62/6	54/
Glengarnock, at Ardrossan	61/6	56/
Eglinton, "	58/	54/
Dalmellington, "	57/6	54/6
Shotts, at Leith	61/	57/
Kinneil at Bo'ness	57/	53/

Messrs. Wm. Colvin & Co.'s quotations approximate to the above. The prices current of John E. Swan & Brothers, Limited, May 11, gives Coltness No. 1, 68/; Glengarnock No. 1, 61/; Eglinton No. 1, 57/6; ballast pig, alongside, 47/6, all per ton.

GREAT FIRE AT A CLYDE SHIPYARD.

On Sunday, May 13, a very destructive fire occurred in the well known shipbuilding yard of Thomas Wingate & Co., which is on the Clyde, about 3 miles below Glasgow. A number of valuable models and patterns, beside a quantity of machinery, including engines in course of construction for the Dutch government, were destroyed, and 500 men are thrown out of work. The damage done is roughly estimated at £70,000 to £80,000.

THE CAPE EXHIBITION.

A special number of the Cape *Times*, just received here, gives a long account of the opening of the South African International Exhibition, at Cape Town, on April 5, and devotes a good deal of space to the Sheffield exhibits. It especially mentions the show cases of Wingfield, Rowbotham & Co., Thomas Turner & Co., John Shaw, Jr., and other houses, which it says have sent such cutlery, etc., as "never found its way to Africa before."

TRADES OF SHEFFIELD.

There has been very little change of any note during the past week, nor do present indications lead to the supposition that there will be any alteration for the better for some months henceforward. The interest of all business men in the Eastern war and its possible developments naturally continues unabated, and in some quarters is causing not a little axiety, especially now that it is daily becoming more apparent that our own government will be compelled to make somewhat formidable preparations in order to be prepared for the naval and military exigencies which may at any moment be forced upon us. Some time ago there was a lingering hope entertained that trade might revive as the year grew older, but this prospective improvement is now pretty generally regarded as being absolutely out of the question, so long as the whole of Europe continues to suffer from a war panic like the present. It is, at all events, quite certain that in the iron trade of this locality the amount of actual business done of late has been exceedingly limited, and in many cases unprofitable, especially as regards merchant irons. In pig iron there have been a few sales during the week, chiefly of West Coast hematites, Derbyshire foundry brands and parcels of forge pig from North Lincolnshire. The Bessemer pig producers appear to uphold their prices very well, considering that the present activity at several of the rail mills cannot very well be exceeded. Maryport "hematite" No. 1 is 70/; No. 2, 67/6; Nos. 3, 4 and 5, mottled and white, 65/. "Bessemer" No. 1, 70/; No. 2, 67/6; and No. 3, 65/ per ton at the works, with 2½ off for prompt cash. Millom "Bessemer" No. 1 is 72/6; No. 2, 70/, and No. 3, 67/6; "Ordinary" Nos. 3, 4 and 5, 67/6, all per ton at the works on the usual four months' bill, or 2½ off for cash.

Some weeks ago there were some ugly rumors afloat here as to the position of two or three local firms and persons in trade. I am now glad to learn that in at least two of these cases the evil day has been staved off, in one instance by "fresh blood," and in the other by relief from another quarter. I hear, also, that some of our hardware manufacturers have been hit by two or three failures in the United States to a pretty considerable tune. I believe the stoppages of Worrall & Co., and of Nicol, Rensslaer & Fuller, both of New York, are examples of this, and that an American tool house is another.

In the cast steel branches there is not a large business in any sense of the term, although I hear that some of the concerns which are mostly engaged in the home trade are fairly well employed, as compared with the firms which have usually pushed a foreign trade. There are, nevertheless, a number of continental and a few American orders in the town. Some of these, as has before been mentioned in these reports, are for bayonet steel, steel ramrods, swords and other materials which happen just now to be in request. Beside these, however, some of the principal concerns have large castings in hand for ultimate use as marine propeller shafts for ordnance tubes, cylinders and other special purposes, beside a few lots of crossings, hornblocks and various engineering appliances. The American general demand for steel does not appear to revive, nor do reports from the United States lead to the belief that the future transactions of Sheffield in this respect with their markets will be larger. Such steel as is now being shipped is mostly of a kind which cannot at present be satisfactorily rolled by the American mills, such as a special class of sheets for clock springs, beveled plow plates, and a few other exceptional sorts. I hear of one Sheffield house which has had over £1000 worth of steel on hand for over a year, it having been kept back because the American customer who had ordered it had failed to remit a previous "little account" of £3000 or so. The second consignment, I believe, had reached the railway station *en route* for Liverpool, when the news came in the nick of time to stop it. At the same time I am not to be supposed to be hinting that the American buyers are worse payers than other people, for this is not the case. Foreign irons for steel converting purposes are not in great request, owing to the quiet state of the steel trade, hence there is not much change in prices from those quoted a short time ago, when arrangements for the season's deliveries were entered into. All the best Swedish brands are controlled by Sheffield houses, and I happen to know that some of these brands are held here in very heavy bulk just now. From Leeds we have the intelligence that the Aireside Hematite Iron Company have damped down both their blast furnaces, owing to the dullness of the demand and consequent accumulation of stock. At the Steam plow works of Messrs. Fowler & Son, too, a large number of men have been discharged, owing to various causes having combined to limit the demand both for steam plowing machinery and locomotives. It is also stated that the rail mill at the Normanton Iron Works is about to be converted into a boiler plate mill, owing to the falling off of orders for rails.

I understand that the Solicitor General, on Saturday last, heard, at his chambers, Paper-buildings, Temple, the relative cases of Mr. Tozer, of London, and Mr. Acaster, Sheffield, for inventions relating to rail fasteners in place of fish plates. The decision was in favor of Mr. Acaster, although I believe the Solicitor General declined to express any opinion on the merits of either invention.

The shareholders of the Parkgate Wagon Company, Limited, met specially at Rotherham on Friday evening last, in order to discuss the question of selling the Parkgate Works. After a long discussion it was decided to sell the Parkgate Works for £9000 to Mr. Wells.

For cutlery the Spanish and Cape markets appear to have revived a little, some houses having orders thence which will clear out a good deal of long-held stock.

BIRMINGHAM AND STAFFORDSHIRE.

The iron trade of these districts remains very quiet indeed, the only inquiries being for merchant iron of special brands, chiefly for the home, Indian and Australian markets. It is reported by latest advices from Melbourne that 26 gauge galvanized sheets are quoted at £26 at Melbourne, while ungalvanized Nos. 8 to 18 are £11. 10/ to £12, with £14. 10/ to £15 for 20 to 26 gauges. Plates were £11 to £13, and hoop iron £11 to £12. Common bars at the Staffordshire works still rule at £6 to £6. 10/, but there is a very slight demand for them, so that few establishments are running more than three days weekly. In hardwares more business is doing with the Spanish West Indies, Australia, and with India, as also to a certain extent with Australia and New Zealand. From Australia there are reports that American hardwares are running Birmingham and Sheffield goods very closely, one Melbourne house alone now turning over £30,000 worth of American hardwares annually, all of which used to come from this country. The Belgians, too, are now competing successfully with Walsall in bits, spurs and other kinds of saddlers' ironmongery.

SOUTH WALES AND MONMOUTHSHIRE.

Last week the total quantity of iron sent from the Welsh forts reached the respectable figure of 7530 tons. The rails went to Madras, Sundswall and Gothenburg; bars to French ports, and some few lots of sheets to Holland. At the Bonville Court Iron and Coal Company's Works, Saundersfoot, the men have gone in at a reduction of 15 per cent. after a strike of seven months. The coal trade continues brisk, last week's exports having been 100,794 tons.

THE METAL MARKETS

have been fairly steady, with the exception of Chili Copper.

Von Dadelszen and North say: "*Copper:* The telegram with the Chili charters for second half of April arrived just after our last report was published. They were 2600 tons, of which 300 tons were for the continent. Chili bars declined on this news to £68. 10/, but have improved to £69. 10, our present quotation. Little doing in Australian. Wallaroo improved to £76 to 76. 10/; and Burra, £85; English steady, tough £75 to £76; select, £77 to £78; strong sheets £81; India sheets, £80. 10/. *Tin* was quiet early in the week with business in Straits at £70, and Australian £68. 15/ to £69; it has since improved, and market yesterday closed firm at £71 for Straits and £70 for Australian. The next Banca sale is advertised for the 30th inst., and to consist of 22,400 slabs. Dutch market firm, but little doing. Banca 43¼fl. Billiton 42½fl. English ingot £74 to £75. Tin plates rather better. *Lead*, firmly held for £21. 10/ for English pig. Soft Spanish, £21 to £21. 5/. *Spelter*, dull, £20. 5/ to 20. 10/ for ordinary Silesian. Sheet Zinc, 125 tons at public sale sold at £24 net. *Quicksilver* steady, at £7. 2/6. *Antimony* dull, at £47 to £48."

The *Mining Journal* remarks: "*Copper.*—The price of Chili bars has been rather better instead of lower, and this has caused several realizations of small parcels, but the demand has now somewhat slackened. The price at the beginning of the week was about £68. 10/, but it ultimately advanced to £69. 10/, which had the effect of bringing out sellers, and the market has gone down since to £69, cash, sellers, at which business has been done to-day. *Lead.*—This metal maintains its position, and ordinary soft is firm at £21. 10/; Spanish, £21. 5/. *Spelter.*—The quotation of Silesian is £20. 5/ to £20. 7/6, and shows but little variation. At the public sale on Thursday 140 tons of zinc were offered, of which 125 tons found buyers at £24, which is a reduction of 5/ per ton upon the previous sale. *Quicksilver* in the middle of the week was reduced 2/6 per bottle, but has now recovered its former rate, and £7. 5/ is to-day's price. *Tin Plates.*—The demand is still unimproved, and neither cake nor charcoal are in much request."

Messes. Reilly & Co (London) say: "*Copper*, in the hands of Chilian importers to some extent, is being held back, and is thus interfering with a market heretofore pretty uniform. *Tin* is pretty firm at quotation; quantity afloat said to be lighter than usual. The total consumption in Europe and America is estimated at 34,000 tons annually. Tin plate trade said to be unremunerative and very slow. *Lead.*—Demand stronger than usual, and dearer, as we predicted. *Spelter* unchanged in price and demand. *Stocks.*—London, 146; Hull, 1083, Grimsby, 20 tons only. With such small figures this useful metal bears a low value. *Quicksilver* firm at £7. 5/. Bar silver cleared off the market almost before it gets on; 54d. the nominal figure."

Latest Liverpool prices are:

Iron: f. o. b. in Liverpool, per ton.

	£	s.	d.		£	s.	d.
Merchant bar	6	12	6	@	6	15	0
Merchant bar, in Wales	6	2	6	@	6	5	0
Staffordshire	7	0	0	@	9	15	0
Hoop	7	10	0	@	8	10	0
Sheet	8	15	0	@	9	15	0
Nail rod	7	10	0	@	8	0	0
Bar, best crown	7	0	0	@	8	0	0
Boiler plates	9	0	0	@	10	0	0

Tin Plates: f. o. b. in Liverpool, per box.

	£	s.	d.		£	s.	d.
Charcoal, I. C	1	2	0	@	1	4	0
Coke, I. C	0	18	0	@	1	0	0

Copper: Delivered in Liverpool, per ton.

	£	s.	d.		£	s.	d.
Bolt and Sheathing	84	0	0	@	0	0	0
Tile	78	0	0	@	0	0	0
Tough cake	78	0	0	@	0	0	0
Best selected	78	0	0	@	0	0	0

Losses by Fire.

THE SCOTT IRON WORKS.

The Scott Iron Works, at Reading, Pa., owned by Seyfert, McManus & Co., have been destroyed by fire. The works occupied a block, commencing at the corner of Eighth and Buttonwood streets, and extending through to Cedar street. It was a complete establishment in every respect, consisting of a foundry capable of turning out the largest castings, pattern shop, machine shop, elevator, &c. During the war the works were engaged largely in the manufacture of cannon for the United States government, and turned out a large number of eleven inch and fifteen inch guns, as well as several of the twenty inch pattern. The Scott Works were originally built by Lewis Kirk, and were afterward operated for a number of years by the Reading Industrial Company, of which Mr. Kirk was the general manager. The foundry was greatly enlarged during the war, and was capable of turning out castings of the largest description.

The pattern house, in which the fire originated, was 55 feet in width by 185 feet in length along Cedar street. It contained a most valuable stock of patterns, all of the finest workmanship. About one-half of the patterns owned by the corporation were stored in this building, while the remainder were kept in a building on the west side of Eighth street, opposite the foundry, and at the steam forge. The patterns kept in the foundry were burned and are a total loss. The corporation had an immense stock of patterns, some of them dating back for a number of years. Their original cost may have been $150,000 to $200,000, but many of them are obsolete and are no longer required. As only one-half of the patterns were destroyed, the loss on this portion of the establishment will probably reach $50,000.

The rapidity with which the fire communicated to the machine shop was remarkable. This department, measuring 100 by 200 feet, was completely burned out. It contained thousands of dollars worth of valuable machines, which are now imbedded among the ruins, in almost inextricable confusion. It is impossible to give any idea as to the actual loss in this department, as this will be a matter hereafter for the underwriters. The building contained the most approved machinery, valued at from $50,000 to $125,000. The fire after spreading along Buttonwood street to Eighth, and thence in the direction of the foundry, terminated at the office on Eighth street, in about two hours after the alarm of fire had been given.

The Reading *Times and Dispatch* says: "As to the loss by the fire no reliable estimate could be obtained, as all was mere conjecture last evening. Several members of the corporation who were consulted, refused to give any estimate as to the loss, or the amount of the insurance. Taking the lowest estimate of the $50,000 on patterns, $50,000 on machinery, and $25,000 on buildings, stock, unfinished work, &c., the minimum loss would be $125,000. By a majority of persons this loss is believed to be much higher, and $250,000 was stated as nearer the actual loss. Whatever the loss may be, it falls very severely upon this community, as it has closed up, but temporarily we hope, one of our largest manufacturing establishments, and thrown many men out of employment, the majority of whom have families to support. The establishment had been in receipt recently of several orders for work of considerable importance, including the building of cotton presses similar to the immense affairs turned out last winter."

As the Scott Iron Works is only one of eight establishments owned by the same company, it will not seriously interfere with their business. The insurance will doubtless enable them to put in the latest and most improved machinery, so that the actual loss will not exceed a few thousand dollars.

THE YOUNGSTOWN ROLLING MILL.

On the night of the 26th a fire broke out in the Youngstown Rolling Mill, at Youngstown, Ohio, completely consuming the whole mill. The Fire Department were promptly on hand, but, owing to the scarcity of water, were unable to render effective aid. Three hundred men are thrown out of employment. The mill cost over $100,000, and was insured for $33,000. The fire was caused by the explosion of an oil can. The regular mill machinery and some very valuable machinery for the manufacturing of cotton ties were also, more or less, injured. Quite a large amount of manufactured iron was destroyed. The mill was owned by Wick, Wells & Beuchner.

Rolls with Wrought Iron Collars.

The Youngstown (Ohio) *Register* says: Some very rapid strides have recently been made in the iron world in the way of improvement, and letters patent have just been issued to a young inventor of this city that will tend, in a great measure, to revolutionize the manufacturing of iron rolls used for merchant iron. For months past Brown, Bonnell & Co., of this city, have been experimenting, endeavoring to manufacture a roll that would give the iron a better finish, causing it to prove more durable. The great difficulty with the rolls now generally used is that they are made from cast iron and are liable to break or cause the groves to pit out on the side.

Mr. David Jones, roll turner at Brown, Bonnell & Co.'s mill, in January last constructed a roll in which the "collars" were made of wrought iron and welded into the body of the roll in such a perfect manner that the whole is one smooth, unblemished surface. The welding of cast and wrought iron is something that had never hitherto been accomplished in the manufacture of "rolls," and of course is an improvement over the cast iron rolls that ironmongers will hail with delight. Mr. Richard Brown, general manager of the works, was quick to recognize the merit of Mr. Jones' invention, and letters patent were at once applied for, and on the fifteenth of the present month the patent was granted. Our reporter while at the works was shown some iron manufactured by the new rolls with wrought iron collars, and its superiority to the iron rolled by the cast iron rolls is perceptible to the most casual observer. The pipe iron shown the reporter rolled by the new patent was twenty and one-eighth inches in width; it was perfectly smooth, and consequently would not crack in the process of welding.

The wrought iron collar will last much longer than the old style and will not, as is the custom, be thrown away when the roll is half used, neither will they "pit," and the finish put on the iron rolled by them is far superior to any other, as the grooves of the patent roll wear perfectly smooth instead of becoming rough as in cast iron. Several iron manufacturers hereabout have examined Mr. Jones' invention and at once pronounced it a success, as the cost of manufacturing it is but a trifle more than what is paid for the old style, and when the question of durability is taken into consideration, it is much cheaper. Messrs. Cartwright, McCurdy & Co. are about putting a set of the new wrought iron rolls into their mill for the manufacture of their celebrated hoop iron. The invention will at once be put into the market by Mr. Brown and the patentee, and in the opinion of experienced iron workers, will soon be adopted by all the best rolling mills of the United States.

Messrs. Brown & Jones have also just patented a pinion, or gear wheel, with wrought iron teeth. This is also an economical invention, as teeth of these pinions made from cast iron break easily and are frequently causing considerable expense and loss of time. These wrought iron teeth will not break, of course, and cannot fail to win their way into favor. They are two of the most important inventions that have been put in use in the working of iron for many years, and their great worth will be recognized at once.

Casting a Statue.

A correspondent writing from Paris describes the casting of a great bronze statue of Dom Pedro I, at one of the art foundries of that city, as follows:

It was late in the evening, about 10 o'clock, when we reached Barbedienne's foundry in the Rue de Lancry, and after having shown our permit, we passed through a large court-yard and entered the foundry. It was as large as a church, and the work benches of the molders, deserted by the workmen at this late hour, were not unlike pews, for they were on each side of a long central passage, and divided by two doors. At the end of the building is the pit in which the mold to be cast was buried. This pit was about 20 feet deep and 15 square, and the mold seemed to fill it, leaving only a few feet of space clear between it and the walls of the pit. This huge mold, we were told, was to produce a statue—or, rather, the lower half of a statue—of Dom Pedro I. In the center of it the "core," which was made of sand, would be taken out after the hot metal was solidified, and was to correspond with the hollow part of the statue. The mold had been built around this "core," leaving a regular space between it and the outer mold, which reproduced exactly in *intaglio* the outer surface of the statue. The business of the bronze was to fill up this space, and thereby reproduce the plaster model from which the mold had been made. This mold was entirely of sand, for, like iron, bronze can only be cast in sand molds; but it was held and braced together by strong bands of wrought iron.

I asked why the casting took place at so late an hour. The foreman explained that they had begun to *garnir* (Anglice, "put together") the mold at 4 o'clock that morning, but that the fire in the furnace for melting the metal was never lighted before that important operation was complete, as the slightest accident in assembling the component parts of the mold might cause some serious results which might postpone the pouring in of the metal. Now that everything was in its proper place we were motioned to examine the furnace. This was a long, low, brick structure. The fire, of coal, was in a large iron grate about six feet square, and the flame was drawn through a large horizontal oven 15 feet long and 4 feet wide. At the end of this it entered into a horizontal flue parallel to the oven and immediately above it, and went with the smoke to the tall brick chimney of the factory, about 60 feet in hight. From five to six tons of coal are used for a casting of this size. In the oven was about six tons of copper—American Lake Superior copper—which, when we were allowed to look through a peep-hole in the side of the brick structure, looked like a mass of burning gold.

One of the assistants began skimming the surface of the metal through an opening at the end of the furnace, his face, chest and arms being covered with wet cloths. He soon took a long rod of clean iron, and after stirring the molten metal with it, brought it out without any of the bronze sticking to it. This, we were informed, was a sign that the copper and zinc in the furnace were at the proper temperature and well mixed. To complete the bronze alloy tin had to be added, but this is done as late as possible, as that volatile metal would soon burn up or evaporate. The long, thin ingots of tin are thrown in, and to insure a thorough mixture with the other component parts of the alloy, they poke it with a long wooden poker, 12 to 15 feet long, made out of a young pine tree. The green wood in burning in the melted metals produces a large amount of carbonic acid, which passes through the metal in bubbles, and insures a more thorough mixture of the component parts of the alloy. In the meantime assistants have constructed in dry sand, held together by large iron frames, a kind of reservoir or tank over the mold. This is to receive the melted metal—for it must all rush into the mold at once; a large hole closed by a plug separates this tank from the mold. A steel chain attached to the plug, passes through a pulley directly above it, but near the roof of the foundry, and if all is right it will be pulled up by the foreman, thereby opening the mold. A long trench or gutter of sand also has been built from the mouth of the mold to the tank, and this is now all ablaze with a fire of wood shavings, to warm it so that the metal will not cool or clog as it runs down. Now the exciting time has come. A workman, holding a long iron lever terminated by a sharp wedge, nears the brick opening of the furnace from which the bronze is to run; two men follow him with large sledge hammers, to assist him. Another man is lowered with a rope into the pit. He holds a lighted torch, with which he is to ignite the gases that escape from the vent holes at the bottom of the mold, the draught produced by these flames drawing all the air from the mold. He whispers to his assistants to draw him up quickly once his work is done, for, as the foreman tells me, if the sand in the mold was at all damp and *cela pourrait bien etre* (it might happen), the mold would explode when the red-hot metal came in and the poor fellow might be crushed to atoms. Now an awful silence prevails, only broken by the blows of the men breaking the furnace open. The metal runs out a clear stream of melted bronze, with little blue flames hovering over it; it accumulates in the tank, lighting up all the foundry with a bluish, golden light. Now the plug is drawn up! The man lights the vents; he also is drawn up safe. A gurgling sound is heard as the molten bronze fills the mold; streams of blue flame and golden sparks fly from the vents, and the figure is cast. The workmen are treated to claret by the "boss" and we retire, hoping that the other half of Dom Pedro I may be cast without accident, as the first half was.

Helmholtz and other mathematicians of the first order who have applied their methods of analysis to the subject, have alleged that the limit of visibility with the microscope has been reached. This belief is based on the theory that light itself is too coarse to permit the subdivision by which yet smaller objects may be revealed to our most powerful lenses. The limit of visibility has been named as the 180,000th of an inch. But this view is not wholly accepted by microscopists. The Rev. Wm. H. Dallinger has made experiments which point to a very different conclusion. He employs a new method of practical observation specially adapted to testing this question, and has constructed lenses which carry the limits of distinct visibility far beyond the boundary announced by the mathematicians. Much smaller objects are thus revealed than the theory referred to would indicate as capable of being seen. Furthermore, Mr. Dallinger does not believe that he has yet reached the limit of division and visibility by instrumental means.

The "Rate of Set" of Metals Subject to Strain for Considerable Periods of Time.

The results of experiments made by Prof. Thurston, in the Mechanical Laboratory of the Stevens Institute of Technology, to determine the time required to produce "set" in metals loaded more or less heavily, and to ascertain what law governs the influence of time in determining the progress and the limit of change of form as the metal yields under loads, either very small or approaching the ultimate strength of the piece, were reported to the American Society of Civil Engineers recently.

This paper* contains some new and valuable information, and throws so much light on the behavior of metals under strain that we think ourselves justified in giving a somewhat extended abstract.

Two methods of testing bars by transverse stress were adopted.

By the first method, the bar was bent to a certain carefully measured deflection, and there held, and its effort to straighten itself was as carefully measured. This effort was at first equal to the load required to bend the bar to the observed deflection, but it gradually became less and less as the bar took a set, and finally either became constant, or the bar broke. In the first case, this loss of straightening power ceased when the bar had taken its set completely.

By the second method, the bar was similarly mounted between supports, but was then loaded with a "dead load" of a certain carefully measured amount, and the manner in which deflection took place and its amount, were very accurately measured.

When the deflection no longer increased, and the bar remained at a constant deflection, the set was complete. In some cases the increase of deflection did not cease until the bar broke.

The paper is divided into two sections: The first on the observed decrease of resistance at a fixed distortion; the second on the observed increase of deflection under static loads. We present the principal deductions nearly in the words of the writer:

SEC. 1. The writer had, in a preceding paper, shown, by reference to experimental researches, in which he had then engaged, that some classes of metals, as ordinary iron and steel, when subjected to strain and distortion by a force exceeding the resistance of the material within the elastic limit, take a set and are stiffened by that act, and exhibit an exaltation of the elastic limit. It was also shown that other classes, like tin, and similarly viscous and ductile materials, exhibit flow and a depression of their limits of elasticity when similarly treated. It was further shown that the former class when subjected to loads, even approaching their ultimate strength, took a certain set and remained apparently indefinitely without further distortion; while the second class, under very moderate loads, frequently exhibit a gradual distortion until fracture took place, sometimes under stresses which were but a fraction of those which were required to break such metals quickly, and when time was not allowed for flow to occur. It was noted that increase of rapidity of distortion and fracture produced increase of resistance in the latter, or "tin-class," and decrease of resisting power in the first, or "iron-class," and *vice versa*.

The writer subsequently instituted experiments upon metals of both classes to determine how rapidly set, in each class, took place. Prof. Norton had also shown by experiment that this set is partially temporary, the bar relieving itself of distortion in some degree on removal of the load. Both experimenters had detected some peculiar variations of form during this recovery, and at times a gradual recovery of straightening power in a confined and flexed bar.

Bars were prepared of square section, 1 inch in breadth and depth, and 22 inches in length between bearings. They were flexed in a machine for testing the resistance of materials to transverse stress, and the load and deflection carefully measured. As the bars were retained at a constant deflection, their effort to resume their original form gradually decreased, and the amount of this effort was from time to time noted. When this effort or resistance had become considerably decreased the bar was released and the set measured. This operation was repeated with each until the law of decrease of elastic resistance was detected. Curves (Plate I) were constructed, illustrating graphically this law.

The following is the record for the bars of iron, of tin and of two alloys: The iron bar No. 648 was subjected to a load of 1003 pounds (somewhat less than one-half its maximum,) and its deflection was found to be 0·0995 inch. Removing the load, the set was 0·0049 inch. Restoring the load (1000 pounds + 3 pounds due to the weight of the bar), the deflection was 0·1001 inch, and the bar was held at this deflection and the decrease of resistance observed. In 25 minutes it had become 999 pounds; in 1 hour 40 minutes, 991 pounds; in 4 hours 35 minutes, 987 pounds, and in 5 hours 20 minutes, 987 pounds. The set was then found to be 0·007 inch under the weight of the bar itself.

Restoring the last observed load, the deflection was 0·0991 inch, and the original load of 1003 pounds increased it to 0·1003 inch.

A second trial of the same bar under a load of 1603 pounds gave a deflection of 0·2548 inches, and a set on removal of 0·1091 inch. Restoring the load, the deflection became 0·287 inch, and the resistance to flexion decreased in 6 hours 3 minutes from 1603 to 1457 pounds, at which latter time the set was found to be 0·1451 inch. Restoring the load of 1457 pounds, the deflection was 0·2863 inch, and the original load, 1603 pounds, being brought upon it, its deflection increased to 0·3016 inch, an increase nearly 20 per cent. above the original deflection.

* Trans. Am. Society of Civil Engineers, Jan., 1877

In the first trial the loss of stiffness, as measured by the decrease of effort of the bar to straighten itself, and which is taken to measure the rate of set, is seen to have been nearly proportional to the time at first, becoming constant after 4½ hours. On the second trial, after a considerable set produced by a heavy load, the set became constant after about one hour, and so remained to the end of the trial.

No. 655 was a bar of Queensland tin, received from the commissioner of that country at the Centennial Exhibition, and which was found to be remarkably pure. A load of 100 pounds gave a deflection of 0·2109 inch, and produced a set of 0·1753 inch. The same load restored, deflected the bar 0·2415 inch, which deflection being retained, the effort to regain the original shape decreased in 1 minute from 100 to 70 pounds, in 3 minutes to 62, and in 8 minutes to 56 pounds. The original load of 100 pounds then brought the deflection to 0·3033 inch, nearly 50 per cent. more than at first.

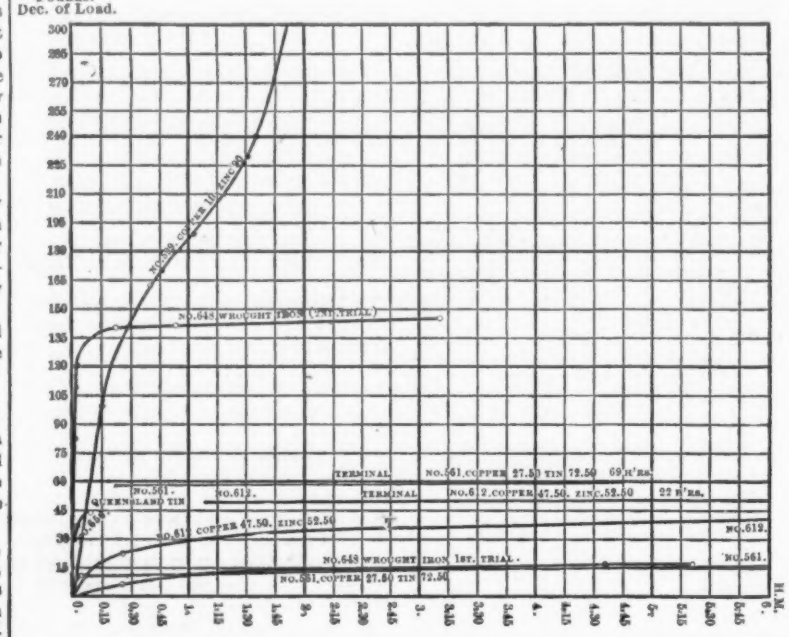

PLATE I.—DECREASE OF RESISTANCE WITH TIME IN TRANSVERSE TESTS OF BARS OF METAL.—RATE OF SET OF BARS, 1 INCH SQUARE, 22 INCHES BETWEEN SUPPORTS.

A bar, No. 599, of copper-zinc alloy similarly tested, deflected 0·5209 inch under 1233 pounds, and took a set of 0·2736 inch after being held at that deflection 15 minutes, the effort falling, meantime, to 1137 pounds. Restoring the load of 1137 pounds, the deflection became 0·5131 inch, and the original load of 1233 pounds brought it to 0·5456 inch. The bar was now held at this deflection and the set gradually took place, the effort falling in 15 minutes to 1133 pounds—4 per cent. more than at the first observation—in 22 minutes to 1093, in 46 minutes to 1063, in 63 minutes to 1043, in 91½ minutes to 1003, and in 118 minutes to 911 pounds; at which last strain the bar broke 3 minutes later, the deflection remaining unchanged up to the instant of fracture. This remarkable case has already been referred to in an earlier paper, when treating of the effect of time in producing variation of resistance and of the elastic limit.

The experiments there described were made by means of a testing machine in which the test piece could be securely held at a given degree of distortion, and its effort to recover its form measured at intervals, until the progressive loss of effect could no longer be detected, and until it was thus indicated that set had become complete.

The deductions were:

That in metals of all classes under light loads, this decrease of effort and rate of set become less and less noticeable, until after some time no further change can be observed, and the set is permanent.

That in metals of the "tin-class," or those which had been found to exhibit a depression of the elastic limit with intermitted strain, under a heavy load—*i. e.*, a load considerably exceeding the proof strain,—the loss of effort continued until, before the set had become complete, the test piece yielded entirely.

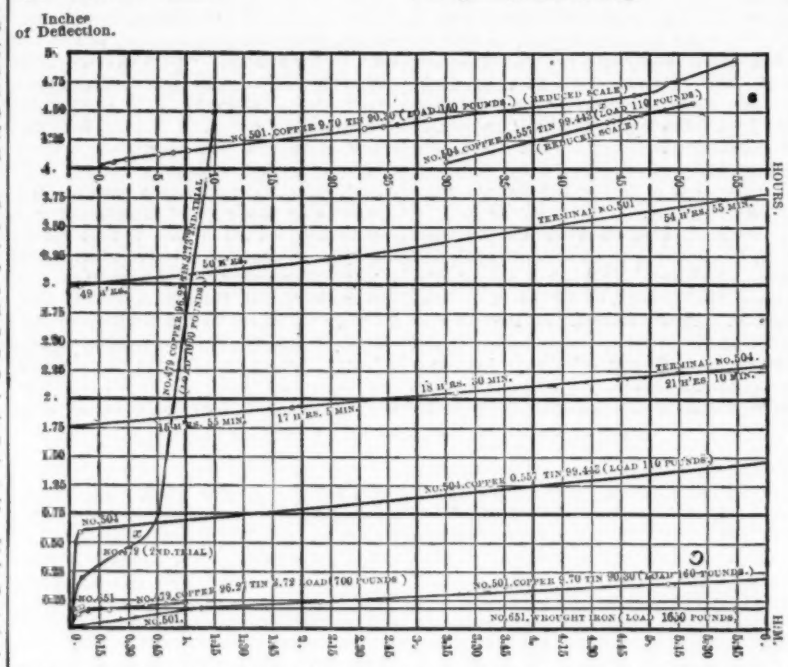

PLATE II.—INCREASE OF DEFLECTION WITH TIME IN TRANSVERSE TESTS OF BARS OF METAL.—RATE OF SET OF BARS, 1 INCH SQUARE, 22 INCHES BETWEEN SUPPORTS.

Nos. 561, copper-tin, and 612, copper-zinc, were compositions which behaved quite similarly to the iron bar at its first trial, the set apparently becoming nearly complete in the first after 1 hour, and in the second after 3 or 4 hours.

In all of these metals, the set and the loss of effort to resume the original form, were phenomena requiring time for their progress, and in all, except in the case of No. 599—which was loaded heavily—the change gradually became less and less rapid, tending constantly toward a maximum.

So far as the observation of the experimenter had extended, the latter is always the case under light loads. As heavier loads are added, and the maximum resistance of the material is approached, the change continues to progress longer, and, as in the case of the brass above described, it may progress so far as to produce rupture, when the load becomes heavy, if the metal does not belong to the "iron-class." The brass broke under a stress 25 per cent. less than it had actually sustained previously.

There is no evidence that iron or steel ever exhibit this treacherous behavior; but, on the contrary, they seem always to carry a load once borne, however near the maximum it may be. This difference is here quite as marked as in the experiments previously reported, upon the elevation and the depression of the elastic limit by strain; and no one can fail to note the value in construction of this quality of that metal, which is the chief reliance of the engineer in nearly every branch of his art. These principles will find numberless applications in the practice of every member of the engineering profession.

SEC. II. In the first section the investigator presented results of an investigation made to determine the time required to produce "set" in metals belonging to the two typical classes, which exhibit, the one an exaltation and the other a depression of the elastic limit under strain.

And that in the metals of the "iron-class," or those exhibiting an elevation of elastic limit by intermittent strain, the set became a maximum and permanent, and the test piece remained unbroken, no matter how near the maximum load the strain may have been.

The experiments now to be described were conducted with the same object as those above referred to. In these experiments, however, the load instead of the distortion was made constant, and deflection was allowed to progress, its rate being observed, until the test piece either broke under the load or rapidly yielded, or until a permanent set was produced. It will be seen that the results of these experiments are in striking accordance with those conducted in the manner previously described; they exhibit the fact of a gradually changing rate of set for the several cases of light or heavy loads, and illustrate the striking and important distinctions between the two classes of metals even more plainly than the preceding. The accompanying record and the strain diagrams (Plate II), which are its graphical representation, will assist our readers in comprehending the method of research and its results.

No 651 was of wrought iron from the same bar with No. 648, already described. This specimen subsequently gave way under a load of 2587 pounds. Its rate of set was determined at about 60 per cent. of its ultimate resistance, or at 1600 pounds. Its deflection, starting at 0·489 inch, increased in the first minute 0·1047; in the second minute, 0·026; in the third minute, 0·0125; in the fourth minute, 0·0088; in the fifth minute, 0·0063, and in the sixth minute, 0·0031 inch, the total deflections being 0·5937, 0·6197, 0·6322, 0·641, 0·6473, and 0·6504 inch. In the succeeding ten minutes the deflection only increased 0·0094 inch, or to 0·6598 inch, and remained at that point without increasing so much as 0·0001 inch, although the load was allowed to remain 344 minutes untouched. The bar had evidently taken a permanent set, and it would probably have remained at that deflection indefinitely, and have been perfectly free from liability to fracture for any length of time.

This bar finally yielded completely under a load of 2589 pounds, deflecting 4·67 inches.

No. 479 was a copper bar containing 3¾ per cent. of tin. Its behavior may be taken as typical of that of the whole "tin-class" of metals, as the preceding illustrates the behavior of the "iron-class" under heavy loads. It was subjected to two trials, the one under a load of 700 and the other of 1000 pounds, and broke under the latter load, after having sustained it 1¼ hours. The behavior of this bar will be considered especially interesting, if its record and strain diagram are compared with those of No. 599, previously given, which latter specimen broke after 121 minutes when held at a constant deflection of 0·5456 inch; its resistance gradually falling from an initial amount of 1233 pounds to 911 pounds at the instant before breaking.

This bar, No. 479, was loaded with 700 pounds "dead weight," and at once deflected 0·441 inch. The deflection increased 0·118 inch in the first 5 minutes, 0·024 in the second 5 minutes, 0·018 in the second 10 minutes, 0·17 in the fourth, 0·012 in the fifth, and 0·008 inch in the sixth 10 minute period, the total set increasing from 0·441 to 0·65 inch. The strain diagram (Plate II) shows that at the termination of this trial the deflection was regularly increasing. The load was then removed and the set was found to be 0·524 inch, the bar springing back 0·126 inch on removal of the weight.

The bar was again loaded with 1000 pounds. The first deflection which could be caught and measured was 3·118 inches, and the increase at first followed the parabolic law noted in the preceding cases, but quickly became accelerated; this sudden change of law is well shown by the strain diagram. The new rate of increase continued until fracture actually occurred at the end of 1¼ hours, and at a deflection of 4·506 inches.

This bar was of very different composition from No. 599; it is a member of the "tin-class," however, and it is seen, by examining their strain diagrams, that these specimens, tested under radically different conditions, both illustrate the peculiar characteristics of the class, by similarly exhibiting its treacherous nature.

No. 504 was a bar of tin containing about 0·6 per cent. of copper—the opposite end of the scale—and exhibited precisely similar behavior, taking a set of 0·323 inch under 110 pounds and steadily giving way and deflecting uninterruptedly until the trial ended, at the end of 1270 minutes—over 21 hours. This bar subsequently was, by a maximum stress of 130 pounds, rapidly broken down to a deflection of 8·11 inches.

No. 501 presents the finest illustration yet entered in the record book of the Mechanical Laboratory of the Stevens Institute of Technology. The test extended over nearly 2½ days under observation, and then left for the night, was found next morning broken. The time of fracture is therefore unknown, as is the ultimate deflection. The record is, however, sufficient to determine the law, and the strain diagram (Plate II) is seen to be similar to that of the second test of No. 479, exhibiting the same tendency to the parabolic shape and the same change of law and reversal of curvature preceding final rupture, and it illustrates even more strikingly the fact that this class of metals is not safe against final rupture, even though the load may have been borne a considerable time, and have *apparently been shown by actual test*, to be capable of sustaining it. A strain diagram of each of the latter two bars is exhibited on a reduced scale, to present to the eye more strikingly this important characteristic.

A comparison of the strain diagrams with those of Section I, in illustration of the behavior of the two classes of metals under constant deflection, is most instructive. The light thus thrown upon the phenomena of distortion and fracture may be of great service to all who are engaged in construction. It will be necessary to make many experiments to determine under what fraction of their ultimate resistance to rapidly applied and removed loads, the members of the "tin-class"—the viscous metals—will be safe under static permanent loads. Their behavior under shocks of various intensities remains also to be determined. The most probable and most satisfactory conclusion which seems likely to be finally reached is, perhaps, that the "iron-class" of metals are capable of carrying indefinitely any dead load which they have once borne, and that, in some manner—by the relief of internal strain, as suggested by Prof. Thurston, or by some other process—their rest under a load renders them, as time goes on, more and more safe under that load.

It is said that the English colonies gained an increased trade by the displays they made at the Centennial Exhibition.

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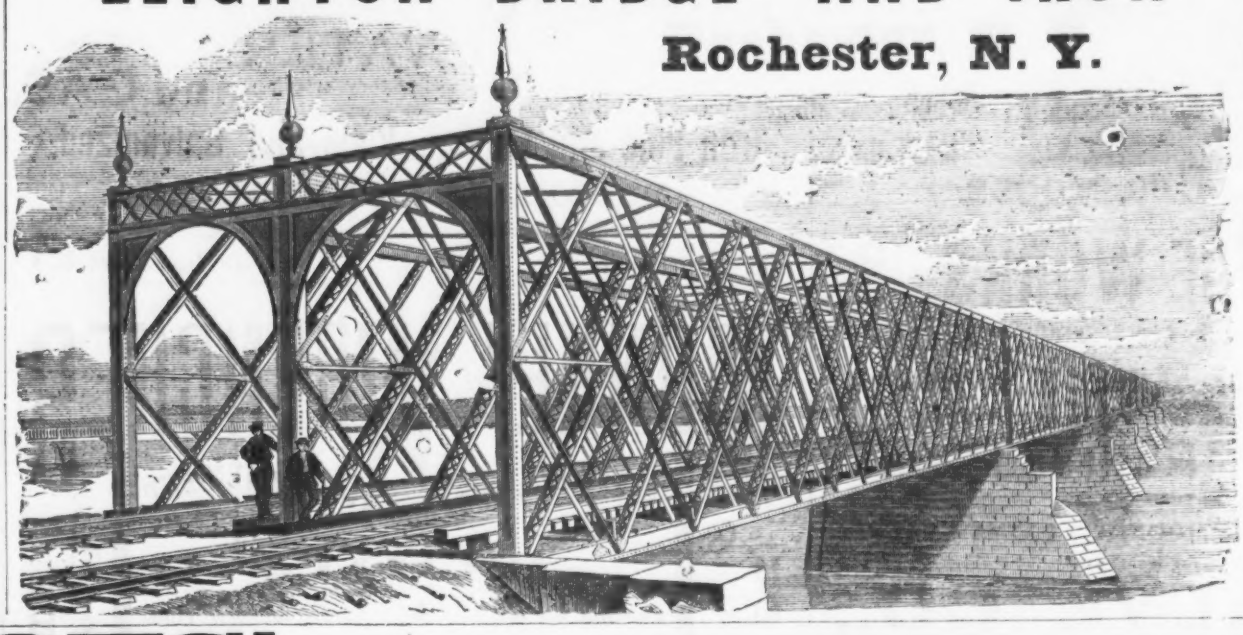

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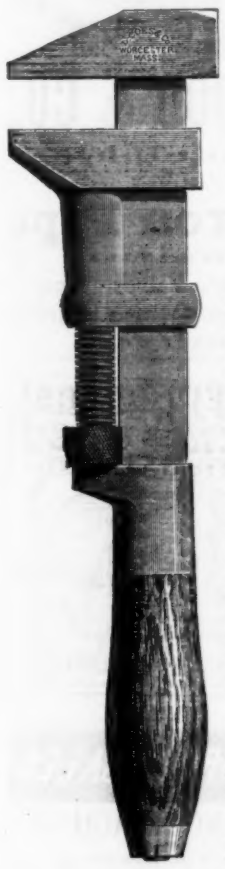

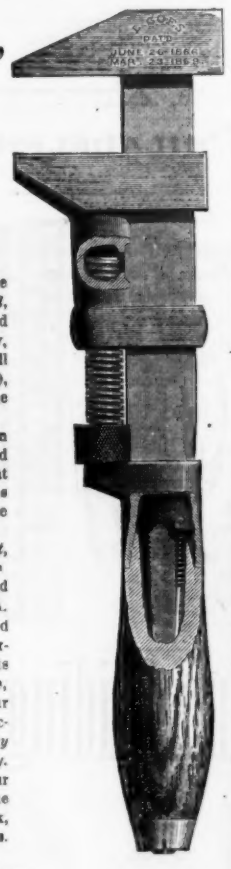

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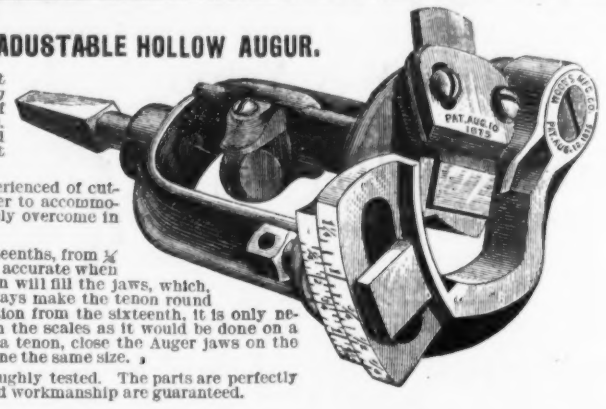

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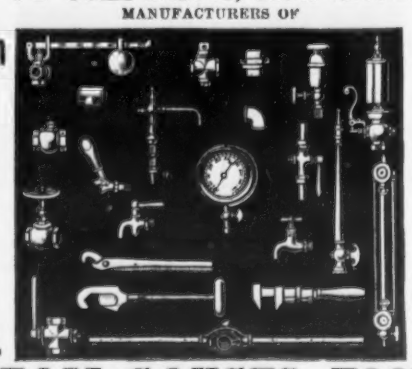

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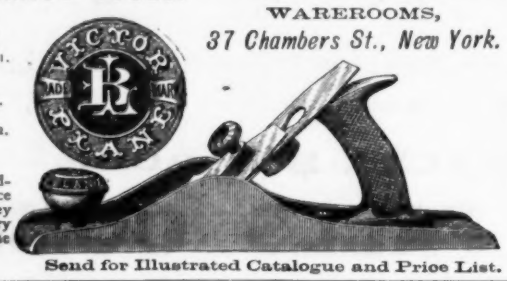

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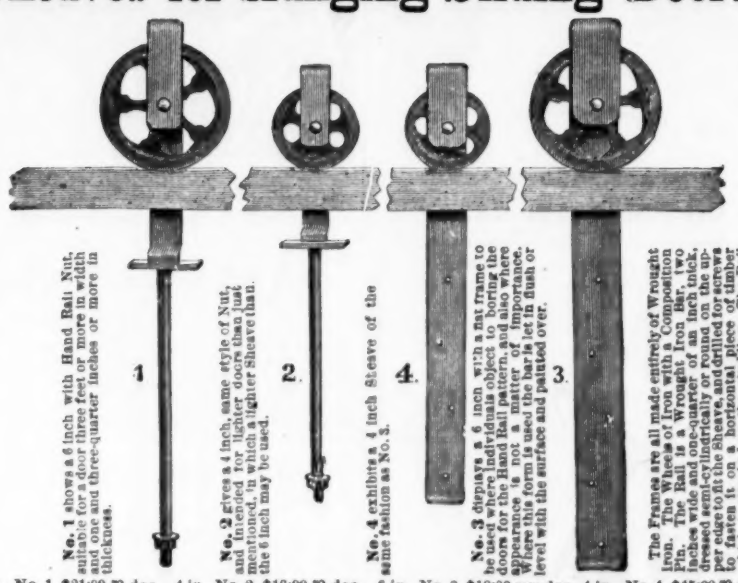

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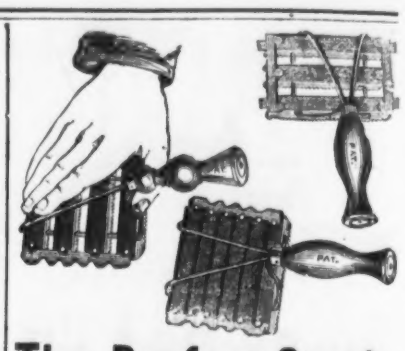

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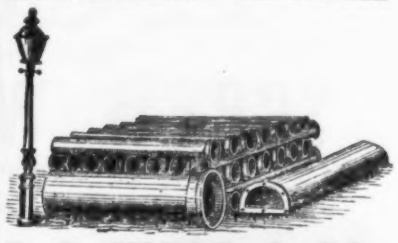

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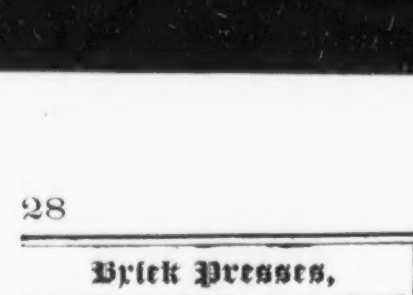

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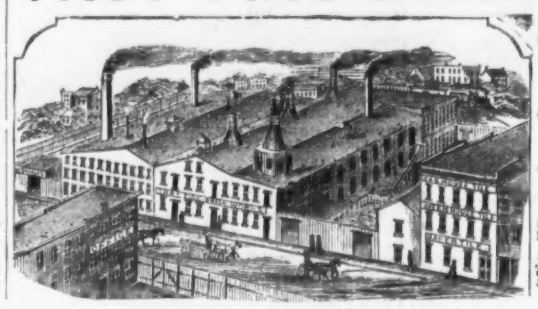

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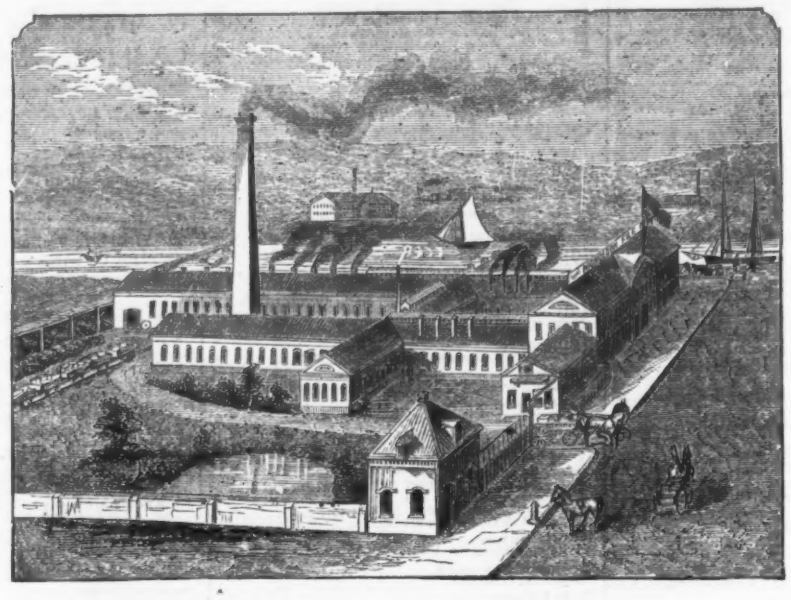

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Eighth.—The large stock carried by us, combined with our superior facilities, enables us to fill the largest orders at the shortest possible notice.

Ninth.—We are constantly making careful tests of our Files by delicately constructed machinery, which **automatically records** the **actual power applied,** forward, backward and downward, at each stroke of the File, also the number of strokes, combined with the work performed, enables us not only to judge of the **quality of our Steel for wear,** but **also of the cutting qualities** of the File, and the ease (expressed in pounds) with which a given amount of work can be accomplished.

Finally.—Our Files **are warranted** to be **hard, well cut** and **sound.** They are exclusively used by many of the largest Railroads and Machinists in the country—and the vigorous growth of our reputation, not only for making a good article, but of **our ability to furnish a good article cheap,** is evidenced by the large number of Dealers and Jobbers who are handling our Files exclusively.

NICHOLSON FILE COMPANY, Providence, R. I.

SOLD BY HARDWARE DEALERS GENERALLY.

Lester Oil Co.,

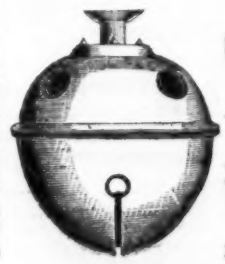
81 MAIDEN LANE, N. Y.

Exclusive manufacturers of the **Renowned**

Synovial Lubricating OILS.

The most Durable, Reliable & Economical Lubricant in existence;

Applicable to every grade of machinery. Send for Circular and Price List.



Established 1838.

Bevin Bros. Mfg. Co.,

Easthampton, Ct.,

Manufacturers of

SLEIGH BELLS.

House, Tea, Hand, Gong Bells, &c.

Bell Metal Kettles.

SUPPLIES

FOR

Railways, Machinists and Amateurs,

Gum and Leather Belting, Packings and Cotton Waste, Babbit Metal.

FINE TOOLS

for Machinists and Amateurs; Barnes' Foot Power Scroll Saw; Foot Lathes all kinds. Sole Agents Baxter Steam Engine. Iron and Wood Working Machinery. Send for Price Lists.

JACKSON & TYLER,

16 German St., Baltimore, Md.

NEWTON & CO.,

Successors to

PALMER, NEWTON & CO.,

ALBANY, N. Y., Manufacturers

FIRE BRICK Stove Linings,

Range and Heater Linings

Cylinder Brick, &c., &c,

B. KREISCHER & SON.,

New York Fire Brick & STATEN ISLAND CLAY RETORT WORKS,

Established 1845.

Office, foot of Houston Street, East Rever, NEW YORK.

The largest stock of Fire Brick of all shapes and sizes on hand, and made to order at short notice.

Cupola Brick, for McKenzie Patent, and others. Fire Mortar, Ground Brick, Clay and Sand. Superior Kaolin for Rolling Mills and Foundries. Stone Ware and other Fire Clay and Sand, from my own mines at New Jersey and Staten Island, by the cargo or otherwise.

Watson Fire Brick Manufactory

ESTABLISHED 1836.

JOHN R. WATSON, Perth Amboy, New Jersey.

Manufacturer of

FIRE BRICK,

For Rolling Mills, Blast Furnaces, Foundries, Gas Works, Lime Kilns, Tanneries, Boiler and Grate Setting, Glass Works, &c.

FIRE CLAYS, FIRE SAND, AND KAOLIN FOR SALE.

A. HALL & SONS, Perth Amboy, N. J.

ESTABLISHED 1846.

HALL & SONS, Buffalo, N. Y.

ESTABLISHED 1866.

FIRE BRICK

of reliable quality for all purposes, manufactured of the best New Jersey Fire Clays. Also, ROCKINGHAM WARE, YELLOW WARE, Fire Clay, Fire Sand, Kaolin Ground Fire Brick, and Diamantine Building Brick.

MANHATTAN FIRE BRICK

and Enameled Clay Retort Works.

ADAM WEBER, Proprietor.

Office, **633 E. 15th St., N. Y.** Clay Retorts, Enameled for Gas Houses; Retorts for burning raw bone and re-burning bone for Bone Black. Fire Bricks, Fire Blocks, Cupola and Range Bricks of all shapes and sizes. The best fire clay from my own Clay Beds at Perth Amboy, N. J.

HENRY MAURER,

Proprietor of the

Excelsior Fire Brick & Clay Retort Works,

Manufacturer of **FIRE BRICK, HOLLOW BRICK AND CLAY RETORTS.**

WORKS: PERTH AMBOY, NEW JERSEY.

Office & Depot: **418 to 422 East 23d St., N. Y.**

BROOKLYN CLAY RETORT AND Fire-Brick Works,

No. 88 Van Dyke Street, Brooklyn, N. Y.

Edward D. White. Surviving Partner of the late firm of **J. K. Brick & Co.**

M. D. Valentine & Bro

Manufacturers of

FIRE BRICK And Furnace Blocks

DRAIN PIPE & LAND TILE.

Woodbridge, - - - N. J.

Troy Polishing Works.

STOVE ORNAMENTS

A Specialty.

No. 7 Sixth Street, TROY, N. Y.

THOS. A. ELGIE, Agent.

Go to BRASS GOODS MFG. CO.,

280 Pearl Street, N. Y., for

Indestructible Business Silver Trade Dollar
Printed Back Mirror
Gold Twenty Dollar
Gold Back Mirror
Useful beside being

CARDS

Also all kinds of Press or Die work done cheaply, satisfactorily, promptly and well.

STEAM PUMPS

Manufactured by

Cranes Bros. Mfg. Co

CHICAGO.

COOKE & BEGGS, Agts

16 Cortlandt St., N. Y.

HOWSONS'

OFFICES FOR PROCURING

UNITED STATES AND FOREIGN PATENTS,

Forrest Buildings,

119 SOUTH FOURTH ST., PHILADELPHIA,

AND MARBLE BUILDINGS

605 Seventh St. (Opposite U. S. Patent Office, ***Washington, D. C.***

H. HOWSON, Solicitor of Patents. | C. HOWSON, Attorney at Law.

Communications should be addressed to the

PRINCIPAL OFFICES, PHILADELPHIA.

New York Wholesale Prices, May 30, 1877.

HARDWARE.

Anvils.
American....⅌ ℔ 15c. dis 20 %
Wright's....⅌ ℔ gold 10½c; over 250 ℔s 11c, gold
Armitage's Mouse Hole....gold 10 @ 10½c
Wilkinson's....⅌ ℔ gold 11c
Eagle Anvils (American)....⅌ ℔ 9c dis 20 %

Apple Parers.
Bay State Parer, Corer and Slicer....⅌ doz $12 00 net
Improved Turn Table....⅌ doz 7·50 net
Faultless Turn Table....⅌ doz 7·50 net
New Lightning....⅌ doz 7·50 net
"Old Reliable"....⅌ doz 5·00 net
Climax Corer and Slicer....⅌ doz 6·00 net
Lightning Peach Parer....⅌ doz 12·00 net

Augers and Bits.
Conn. Valley Mfg. Co.; Douglass Mfg. Co.; Ives; Beecher (French, Swift & Co); Griswold; Nobles Mfg. Co; Kasson's Patent } 1st qual...dis 45&5 %; 2d quality. dis 50&5 %
Cook's, Douglass Mfg. Co....dis 50&5 %
" Ives'....dis 50 %
Snell Mfg. Co....dis 30&10 %
Jennings' Bits....dis 10 %
Ives' "Jennings" Bits....dis 10&10 %
Lewis' Single Twist Bits....dis 25 @ 30 %
Andrews Bits....dis 40&10 %
Griswold's Patent Bits....dis 30 %
Expansive Bits, Clark's small, $18; large, $26, dis 15 @ 20 %
" " Ives....$20 @ $30—dis 30 %
" " Blake's....$20—dis 40 %
" " Parmelee's....small, $20; large, $36....dis 25 %
Hollow Augers, Ives'; " " French, Swift & Co.... } dis 33⅓ @ 40 %
" " Bonney's Adjust..⅌ doz $48—dis 25&10 %
" " Stearns' Adjust...⅌ doz $48—dis 25&10 %
" " Ives' Expansive....each $4·50—dis 40 %
" " Universal Expansive.each $4·50—dis 10 %
Gimlet Bits—Screw, $7·50; no screw, $9....dis 40 %
" " Diamond....per doz $1·00 dis 10 %
Double Cut Gimlet Bits, Shepardson's....dis 30 %
" " Ct. Valley Mfg. Co..dis 30&10 %
" " Hartwell's....dis 50&5 %
" " Douglass'....dis 25&10 %
" " Ives'....dis 33⅓ %
Morse's Bit Stock Drill, List of Jan'y 1, '76....dis 25 %
L'Hommedieu's Ship Augers....dis 20 %
Watrous Ship Augers....dis 20 %

Awls, Brad Sets, &c.
Awls, Sewing, Common....per gross $1·35—dis 25 %
" " Best....per gross $1·60—dis 10 %
" Shouldered Peg....per gross 2·25—dis 15 %
" Patent Peg....per gross ·60—dis 15 %
" Shouldered Brad....per gross 2·70—dis 25&10 %
Brad Sets, Aiken's....per doz $12·00—dis 40 %
" No. 42, $10·50; No. 43, $12·50....dis 60 %
" Clark's....dis 50 %
" Stanley's Excelsior...No. 1, $11·00, dis 25&10 %

Axles.
Common (Guy C. Hotchkiss, Field & Co.)....⅌ ℔ 4½c
Solid Collar, Case Hardened, Chilled Box....⅌ ℔ 8c
Axle Grease.—Frazer's....⅌ ℔ 6c.

Balances.
Light or "Common"....dis 25&10 %
All other Spring Balances....dis 25 %
Bands.—Plated....new list dis 50&5 %
Iron Rim....new list dis 25&5 %
Brass (Plated list)....new list dis 50, 10&5 %
Oreide....new list dis 50&5 %

Bed Keys.
Gray's Ratchet....⅌ doz $4 00, dis 15 %

Bells.
Hand, Light Brass....dis 75 %
" Extra Heavy....dis 40&10 %
" White Metal....dis 50&10 %
" Silver Chime....dis 20&10 %
" Swiss....dis 25 %
" Globe (Cone's Patent)....dis 20&10 %
Gong Abbe's....dis 20&10 %
" Yankee....dis 35&10 %
" Barton's....dis 35 %
Crank, Taylor's....dis 25&10 %
" Brook's....dis 50 %
" Cone's....dis 10 %
" Connel's....dis 50&10 %
Lever, Sargent's....dis 60&10&10 %
" Taylor's Bronze or Plated Lever....net
" " Japanned Lever....dis 25&10 %
" Hart, Bliven & Mead Mfg. Co....dis 50&10 %
Pull, " " " "....dis 50&10 %
" Brook's....dis 50 %
" Western....dis 25&10 %
Call....dis 20 %
Cow—Common Wrought....dis 20&10 %
" Western....dis 20&10 %
" " Sargent's....dis 60&10 %
Kentucky "Star"....dis 20&10 %
" Sargent's....dis 60&10 %
Dodge's Genuine Kentucky, new list—

Nos.	0	1	1½	2	3	4	5	6	Hog.
	$12·00	10·00	9·00	8·00	6·00	5·00	3·50	2·50	5·00—dis 40 %

" Yaw's Genuine....dis 50 %
" Texas....dis 40 %

Bellows.
Blacksmiths', Common....dis 20 @ 35 %
" Extra and Pittsburgh Pattern....dis 20 %
Moulders'....dis 25 %
Hand Bellows....dis 20 %
Blind Adjusters.—Domestic....⅌ doz $3—dis 20 %

Blind Fasteners.
Mackrell's....dis 30 %
Van Sand's....No. 2000, $14·00; dis 25 %
" old pattern....per gross, $10·50, dis 5 %
Washburn's Patent....⅌ gross $14·00 dis 25 %
Merriman's....new list net

Blind Staples.
Boardman's Patent, ⅝ in. and larger....⅌ ℔ 37 c
" ⅜ in...." 42 c

Blocks.
Differential Pulley Blocks....dis 20 %
Tackle, Rope and Iron Strapped, Providence Tool Co.'s list....dis 30&10 %
Stanley Rule and Level Co....dis 25&10 %

Blowers.
Keystone Portable Forge Co....dis 20 %

Bolts.
Cast Iron Barrel, Shutter, &c....dis 60&10&10 %
Cast Iron Chain....dis 60&10&10 %
Wrought Iron Barrel....dis 50, 10&10 %
" " Square....dis 50, 10&10 %
" " Shutter (Stanley's list)....dis 50 %
" " " (Sargent's new list).dis 50, 10&10 %
" " Flush, Stanley's....dis 15&10 %
" " " Sargent's....dis 50&10&10 %
Carriage and Tire, Common....dis 75&5 % cash
" " " Norway Iron....dis 50&10 %
" " " R. B. & W....(old list) dis 65&5 %
" " " Philadelphia....dis 60&10 %
" " " Shelton's....(old list) dis 60&20 %
Union Nut Company, old list....dis 60&5 %
Stove—American Screw Co.'s....dis 45 @ 50 %
" R. B. & W....dis 50 %
" Shelton's Shaved Head....dis 45 %
" Union Nut Co....dis 45 %
Plow, R. B. & W....dis 40 %
Machine....dis 65 @ 70 %
Bolt Ends....dis 60
Borax.....12 @ 12½c. ⅌ ℔

Boring Machines.

	Upright.	Angular.
Hover's, no Augers	$3·15	$4 00 net
" with Augers	5·00	6·00 net
Parr's, no Augers	5·00	7·50 dis 30 %
" with Augers	7·80	10·00 dis 30 %
Kellogg's, no Augers	5·25	6·75 dis 15 %
Sweets' "	3·25	4·00 net
" with Augers	5·00	6·00 net
Snell's "	4·75	6·25 dis 25 %
Phillips' with Augers	....	10·00 dis 25 %

Bow Pins.
Union Nut Co....dis 60&5 %
Hotchkiss'....dis 55 %
Humason, Beckley & Co.'s....dis 60 %
Sargent & Co.'s....$19·70 and $21·40, dis 60&10 %

Braces.
Barber's Patent....dis 40&5 %
Q. S. Backus....dis 50 %
Wilson Mfg. Co....dis 10 %
Spofford's Patent....dis 50 %
Noble's Patent....dis 40&5 %
Ives' "Centennial"....dis 40&10 %
" "Novelty"....dis 50 %
Common Ball (American)....dis 25&10 %
Brackets.—Shelf....dis 60&10 @ 65&10 %
Bright Wire Goods....dis 65&10&10 %
Bull Rings.—Union Nut Co....dis 50&20 %
Sargent's....dis 66⅔&10 %
Hotchkiss'....2½ in., $2·25 net
Humason, Beckley & Co.'s....dis 60 %
Union Nut Co....dis 60&5 %

Butchers' Cleavers.
Humason & Beckley Mfg. Co....dis 20 %
D. R. Barton Tool Co....dis 20 %
Bradley's....dis 25 %
Beatty's....dis 20 %

1	2	3	4	5	6	7	8
$16·50	$19·00	$21·50	$24·00	$27·00	$30·00	$33·50	$36·50

Hart Mfg. Co....dis 50&10 %

0	1	2	3	4	5	6
$25·25	$29·75	$34·25	$38·75	$43·25	$49·50	$54·00

Butts.
Wrought Brass....dis 50 %
Cast Brass....dis 20 %

COMMON CAST, NOT DRILLED. (10 % for cash.)
Fast Joint, Narrow....dis 45 %
" Broad....dis 55 %
" " Jap'd....dis 50 %
Loose Joint, Narrow and Broad....dis 60 %
" " " Jap'd....dis 60 %
Parliament Butts & Mayer's Hinges....dis 55 %
Loose Pin....dis 60 %
Loose Pin Japanned....dis 65 %
Loose Pin Jap'd, Plated Tips....dis 60 %

DRILLED AND WIRED. (10 % for cash.)
Fast Joint, Narrow....dis 40
" Broad....dis 50
Fast Joint, Broad, Japanned....dis 45
Loose Joint....dis 55
" Japanned....dis 55
Parliament & Mayer's Hinges....dis 50
Loose Pin, no Acorn....dis 57½
" Acorns....dis 55
" " Japanned....dis 60
" " " Plated Tips....dis 55

Union Mfg. Co.'s Fancy Butts.—
Figured Enameled Loose Joint....dis 55&10 %
Boston Finish, Plain....dis 50&10 %
Boston Finish, with Iron Acorns....dis 75&10 %
" " with Sil'd "....dis 65&10 %

WROUGHT IRON.
Fast Joint, Narrow....dis 40&10 %
" Lt. Narrow....dis 30&10 %
" Broad....dis 40&10 %
Loose Joint, Broad....dis 40&10 %
Table Butts, Back Flaps, &c....dis 35&10 %
Inside Blind, Regular....dis 35&10 %
" " Light....dis 40&10 %
Loose Pin, Wrt....dis 40&10 %
Am. Spiral Spring Butt Co., Japanned....dis 25 %
" " " Fancy....dis 10 %
Sabin Mfg. Co., Double Acting....dis 35 %
Union Spring Hinge Co....dis 25 %
Union Mfg. Co. Spring Hinges....dis 25 %
Blind Butts, Parker....dis 70&10 %
" Palmer....dis 40&10 %
" Seymour....dis 60&10 %
" Shepard....dis 60 %
" Lull & Porter....dis 60 %
" Nicholson....dis 45&10 %
" Huffer....dis 33⅓&10 %
" Garretson....dis 60&10 %
" Clark's, Nos. 1, 3, 5, 40 and 50....dis 60 %
" " Nos. 2, 4, 4½, 6, 8, 10....dis 50&10 %
" Sargent's....dis 70&5&10 %

Can Openers.
Messenger's Comet....per doz $3·00 dis 20 %
American....per doz 2·25 dis 50&5 %
Lyman's....per doz 3·75 dis 20 %
No. 4, French....per doz 2·25 dis 50 %
No. 5, Iron Handle....per doz 2·25 dis 50&5 %
Sprague's....Nos. 1, 2, 3; Per doz $2·00, 2·25, 2·80 dis 25 %
Eureka....per doz $2·50 dis 10 %
Sardine Scissors....per doz $7·00 dis 40 @ 40&5 %

Caps—Percussion, per 1000.
Hicks & Goldmark's G. D. & S. R....37 @ 40c
" " E. B. 1-10 Ground....70c dis 5 %
" " E. B. 1-10 Turned....65c dis 5 %
" " D. W. P. 1-10....$1·40 dis 5 %
" " D. W. P. ¼....$1·35 dis 5 %
" " Colt's 1-10....70c dis 5 %
Ely's E. B....1-4s, 58c.; 1-10s, 70c. gold
" Double Waterproof, 1-4s, $1·50; 1-10s, $1·58c., gold
Colt's....1-10s, 80c., gold

Carpet Sweepers.
Union....each $2 75 net
Welcome....each 2 75 net
Cartridges.—Metallic....dis 60 %
Cards.—Horse and Curry....dis 30&10 %
Cotton....dis 10&10 %
Wool....dis 15&10 %

Carpet Stretchers.
Cast Steel, Polished....per doz $5·00 dis 30 %
Cast Iron, Steel Points....per doz $2·00 dis 45&5 %

Casters.
Bed....dis 55 %
Plate and Shallow Socket....dis 55 %
Deep Socket....dis 40 %

Cattle Leaders.
Hotchkiss' Sons'....net
Humason, Beckley & Co.'s....dis 60 %
Sargent's....dis 60&10 %
Union Nut Co....dis 60&5 %

Chain.
English Coil....net gold

⅌ ℔	11½	8½	7¾	7½	7¼	7c
	3-16	¼	5-16	⅜	7-16	½

Trace, 6½-10-2....by the cask, ⅌ pair, gold 50 @ 52c
Trace, 7-10-2....by the cask, ⅌ pair gold. 55 @ 57c
German Halter Chain....dis 25 @ 30 % gold
German Coil....dis 25 @ 30 % gold
Galvanized Pump Chain....⅌ ℔ 10½c.
Jack Chain Iron....dis 55&10 %
" Brass....dis 45&10 %

Chalk.
White....⅌ gross, 55c net
Red....⅌ gross, 75c net
Blue....⅌ gross, 90c net
White Crayons....⅌ gross, 14c net

Chisels.
D. R. Barton Tool Co. (all kinds)....dis 20 %
Socket Framing, Crossman....dis 60&5 %
" " Buck Bros....new list dis 17½ @ 20 %
" " Hart Mfg. Co., No 1....dis 60&10&10 %
" " Merrill....dis 60&10 %
" " Witherby Tool Co....dis 60&10 %
" Firmers, Crossman....dis 60 %
" " Buck Bros....new list dis 17½ @ 20 %
" " Hart Mfg. Co., No. 1....dis 60&10 %
" " Merrill....dis 60&10 %
" " Witherby Tool Co....dis 60&10 %
Socket Corner....dis 65 @ 70 %
Tanged Firmers, extra....dis 40 %
" " Butcher's....$5·25 to £ gold
" " Newbould's....$5·50 to £ gold
" " Spear & Jackson's....$5·00 to £ gold
" " Buck Bros (Shank)....$5·25 to £ gold

Clamps.
Iron, Providence Tool Co.'s, Wrt. Iron....dis 25 %
" Adjustable, Gray's....dis 20 %
" " Lambert's....dis 20 %
" " Snow's....dis 40&5 %
" " Hammer's....dis 15 %
" Cabinet, Sargent's....dis 60&10 %
" Carriage Makers', Sargent's....dis 60&10 %

Coffee Mills.
Board and Box....dis 25 %
Increase Wilson's....dis 25 %
Selsor's Pat....$9·50, $10·50—dis 25 %
American (Enterprise Mfg. Co.)....dis 20 %
French Steel....dis 20 %
The Swift....dis 25 %
Compasses and Dividers.....dis 35&10 %
Bemis & Call Co.'s....dis 35&10 %
Cook's....dis 15 %
Excelsior....dis 40 %
Miller's Patent....dis 25&10 %

Coopers' Tools.
Bradley's....dis 15 @ 20 %
Chas. E. Little....dis 20 @ 25 %
D. R. Barton Tool Co....dis 20 %
Corkscrews.—Humason & B....dis 33⅓ %
Corn Knives and Cutters.
Bradley's....dis 10 %

Crow Bars.
Cast Steel....⅌ ℔ 9c. net
Iron, steel points....⅌ ℔ 5c
Crucibles.—Gautier & Co....⅌ No. 5½c

Curling Irons, &c.
¼, ⅜, ½ in., $1·80, $2·00, $2·40....dis 10 %
Curling Tongs....⅌ doz $6 50—dis 15 %
Pinching Irons....⅌ doz 7 50—dis 20 %

Curry Combs.
Curry Comb Mfg. Co....dis 25&10 %
Fitch's (List of No. 240, $1)....dis 30&10 %
Hotchkiss' & Kellogg's, Iron & Brass, old list.dis 40&7½ %
Hotchkiss' Novelty....dis 10&10 %
Rubber....⅌ doz, $9·00—dis 15 %
Wood Tooth (Fuller Bros.)....per doz $2·25 net

Clips, Axle.
Norway or Best....dis 50 %
Superior....dis 55 %
Cockeyes....1¼ in., 28c.; 1½ in., 33c.; 1¾ in., 37c. net

Cocks.
Brass Racking....dis 50 %
Lock and Globe....dis 50 %
Lever Bibbs....dis 50 %
Ale and Beer....dis 40 @ 45 %
Curtain Pins.—Silvered Glass....new list dis 15 %

Cutlery.
Am. Pocket—Humason & Beckley Mfg. Co....dis 25 %
Am. Miller Bro.'s Cutlery Co....dis 25 %
Naugatuck Cutlery Co....list net
Rogers Cutlery Co....net

Dippers.
Britannia....per doz $3·75 @ $4·25 net
Cocoa, Plain....per doz $3·25—dis 20 %
" Rimmed....per doz 3·75—dis 20 %

Dog Collars.
Embossed Gilt....dis 20 %
Leather....dis 30 %
Brass....dis 25 %

Door Springs.
Torrey's Rod....⅌ doz $2·10 net
Gray's "....⅌ doz $2·00 @ $2·15 net
Johnson's "....⅌ doz $3·00 net
Gem (Coil)—
No. 1, Large, Japanned....per doz $3·50
No. 2, Medium, "....per doz 2·50 } dis 10 %
No. 3, Small, "....per doz 2·00

Challenge (Coil)—	Nos.	9	7	6	
Japanned	per doz	$2·00	2·50	3·50	dis 10 %
Coppered	per doz	4·30	4·50	5·00	
Galvanized	per doz	3·50	4·00	4·50	
Nickeled	per doz	5·50	6·00	7·00	

Premium (Coil)—	Nos.	1	2	3	
Japanned	Per doz	$7·50	6·25	5·00	dis 30 %
Nickeled	Per doz	11·00	9·50	8·00	

Star (Coil)—(For Cop'd, Nickel Plated, &c., see list.)
No. 5, Small....per doz $2·00
No. 6, Medium....per doz 2·50 } dis 15 %
No. 7, Large....per doz 3·50
Philadelphia....5 in., $5·00; 8 in., $7·00 dis 25 %
Barker's Concealed....dis 15 %

Drawing Knives.
Crossman's No. 1....dis 60&5 %
D. R. Barton Tool Co....dis 20 %
Hart Mfg. Co., No. 1....dis 60&10&10 %
Merrill....dis 60&10 %
Nobles Mfg. Co....dis 15 %
Bradley's....dis 25 %
Adjustable Handle....dis 20 %
Witherby Tool Co....dis 60&10 %

Drills and Drill Stocks.
Blacksmiths'....each $2 50 dis 10 %
" Self-Feeding....each $7 50 dis 10 %
Breast, P. S. & W....dis 45 %
Breast, Aiken's....dis 25&10 %
" Hotchkiss....dis 10 %
" Wilson's....dis 10 %
" Miller's Falls....each $2·50, dis 25 %
Ratchet, Merrill's....dis 20 %
" Ingersoll's (old list)....dis 35 %
" Whitney's....dis 20 %
" Weston's....dis 20 %
" Moore's Triple Action....dis 20 @ 25 %
Wilson's Drill Stocks....dis 10 %
Automatic Boring Tools....each $2·75, dis 20 %

Drill Chucks.
Danbury....each $8·00, dis 30 %
Morse's Beach Patent....dis 30 %
" Adjustable....each $10·00, dis 30 %

Egg Beaters.
Dover....⅌ doz $5·00—dis 20 %
National....⅌ doz $4·50—dis 33⅓ %
Schofield....⅌ doz $3·50

Emery.
Genuine Chester—Regular Nos....⅌ ℔ 6c; " Flour and FF....⅌ ℔ 4c } dis 10 %
Washington Mills—Regular Nos....⅌ ℔ 8c
" Flour....⅌ ℔ 5c
Wellington Mills, Grain....⅌ ℔ 10c. net
" " Flour....⅌ ℔ 8c. net

Enameled and Tinned Ware.
Kettles....dis 40 @ 50 %
Sauce Pans....dis 30 @ 35 %
Glue Kettles....dis 30 @ 35 %
Tinned Saucepans....dis 30 @ 35 %

Escutcheons.
Door Lock....Same discounts as Door Locks
Brass Thread....dis 60&10 %
Wood....dis 25 %

Faucets.
Fenn's....dis 50 %
" Cork Stops....dis 40 %
Star....dis 55&10 %
Frary's Patent Petroleum....dis 20&10 %
Wood and Metallic....dis 40 %
Wood, Cork Lined....dis 65&10 %
Enterprise Mfg. Co., Self-Measuring....dis 20 %
Felloe Plates....⅌ ℔ 15c; dis 40&10 %

Files.
American File Co....$5 00 to £ currency—dis 30 %
Arcade File Works....$5·00 to £ currency
Auburn File Works....$5 00 to £ currency
C. B. Paul's....$5 00 to £ currency
Heller & Bros....$4·50 to £ currency
Hiscox File Mfg. Co....$5 00 to £ currency, dis 15 %
Johnson & Bro....$5 00 to £ currency
Madden & Cockayne File Co....$5 00 to £ cur., dis 15 %
Jowitt's....4 50 to £ gold
J. & Riley Carr....5 00 to £ gold
Stubs'....7 50 to £ gold
Butcher's....4 50 to £ gold
Walter Spencer & Co.'s "Diamond"....4 50 to £ gold
Fisher's....4 75 to £ gold
Moss & Gamble....4 75 to £ gold
Thos. Turner & Co. (Peter A. Frasse & Co.) 4 50 to £ gold
" " Horse Rasps....5 00 to £ gold
H. Disston & Sons....dis 30 %
Limet & Co. (French)....4 25 to £ gold
Boyton's Cant....dis 40 %

Fluting Machines
Mrs. Coles'....5 in., $6·00; 7 in., $7·00, dis 25 %
" Pony..4 in., $4·75; 5 in. $5; 6 in. 5·50; 7 in. $6 dis 25 %
Mrs. Knox, No 1876....each $5·20, dis 30&10 %
Knox Imperial, 1877....$5·20; dis 20&10 %
Knox, 4 inch Rolls....$3 25 each dis 10 %
" 6 "....3 80 each dis 10 %
" 8 "....5 60 each dis 10 %
Peerless, 4-inch Rolls....4 00 each net
" 5 "....4 75 each net
Improved Knox (Climax), 4 inch....2 65 each net
" " " 6 "....3 15 each net
" " " 8 "....4 90 each net
Champion, 6 inch rolls....6 00 each net
" 4 inch rolls....5 00 each net
Empire....4 00 each net
Eureka, No. 1, 7-inch Roll....6 75 each net
" No. 2, 5-inch Roll....5 00 each net
Defiance....4 in., $3·50; 6 in., $4·00; 8 in., $6·50 each net
K. F. M., 4½-inch Roll....3 50 each net
" 6-inch Roll....4 00 each net
Crown...4½ in. Roll, $2·50; 6 in., 3·00; 8 in., 4·25 each net
Domestic Fluter....$1·50 each net
Geneva Hand Fluter....$15 00 per doz net
Combined Fluter and Sad Iron....⅌ doz $15·00 dis 10 %
Fluting Scissors....dis 35&10 %

Forges.
"Empire" (W. P. Kellogg & Co....dis 20 %
Keystone Portable Forge Co....dis 20 %

Forks.
Hay, Manure & Spading....dis 35 %
Plated A 1....dis 40&5 %
" Reed & Barton....dis 40&5 %

Fruit and Jelly Presses.
Enterprise Mfg. Co....dis 20 %

Fry Pans.
Burnished, P. S. & W., new list....dis 55 %
⅌ doz....$3·00 3·75 4·25 ·75 5·25 6·00 7·00 8·00 9·00
No.... 0 1 2 3 4 5 7 8

Gauges.
Marking....45&10 %
" Star....dis 35 %
Wire....dis 10 %
" Smith's Patent....doz $18·00, dis 40 %

Gimlets.
Nail and Spike....dis 40 %
"Bee" Gimlets....per gross, $12·00, dis 45 %
"Eureka" Gimlets....dis 40 %
Double Cut, Shepardson's....dis 20 %
" " Hartwell's....dis 40 %
" " Ives'....dis 33⅓ %
" " Douglass'....dis 25&10 %

Glue Pots.
Tinned and Enameled....dis 35 @ 40 %
Family, Howe's "Eureka"....dis 25 %
" L. F. & C.'s "Handy"....dis 25 %

Grind Stone Fixtures
Sargent's Patent....dis 70&10&10 %
Reading Hardware Co. (New List)....dis 40&10 %
Hart Mfg. Co.'s....dis 60&5&10 %
Rick Bros....dis 45&5 %

Hammers.
Emmet Hammer Co.'s Handled....dis 35 %
" " Sledge & Stone.⅌ ℔ 40c.; dis 40 %
Humason & Beckley Mfg. Co....dis 33⅓ %
Maydole's....New List, Jan. 1, '77, dis 15 %
Henry Hammonds'....new list Jan. 1, 1877. dis 15&5 %
Cheney's, Steel Face and Claw....dis 10 %
" all steel....dis 20&10 %
Verree....dis 5 %
Magnetic Tack....dis 25&10 %
Warner & Noble's....dis 10 %

Hand Cuffs and Leg Irons.
Tower's Hand Cuffs, $4 00 per pair; " Leg Irons $6 50 per pair } dis 35 %
Providence Tool Co.'s Hand Cuffs.. $15 per doz; " " Leg Irons ... 25 " } dis 10 %

Handles.
Door or Thumb Latches—

Nos.	0	1	2	3	4
Per doz	$0·80	1·00	1.18	1.35	1·50—dis 60&10 %

Roggin's Latches....35c. @ 40c. net
Bronzed Iron Drop Latches....per doz $1·00 @ 1·25 net
Wrought Chest....dis 60&10 %
Surface Chest, Sargent's list....dis 60&10&10 %
Flush Chest....dis 60&10&10 %
Lifting....dis 60&10 %
Saw and Plane....dis 25&10 %
Boynton's X Cut (Loop)....dis 20 %
" X Cut (Centennial)....dis 15 %
Hammer and Hatchet....dis 10 %
N. Carolina Handle Co....dis 15 %
Brad Awl....per gross $3 75, dis 25&10 %

Hickory Firmer Chisel,		ass'td	"	5 25	dis 40 %
" "	"	large	"	6 50	
Apple	" "	ass'td	"	6 00	
"	" "	large	"	7 50	
Socket	" "	ass'td	"	4 50	
" Framing	"	"	"	7 00	
File		"	"	3 50	
Auger		"	"	6 00	
"		large	"	7 00	

Patent Auger, Ives'....dis 25&10 %
" Douglass'....per set $1 25—dis 10 %
" Swan's....per set $1 00—dis 20&10 %

Hangers.—Barn Door....dis 70&10 %
"Anti-Friction" No. 1, $1·25; No. 2, $1·50 ⅌ pr. dis 40@10 %
Novelty....dis 40 %
Challenge....dis 50 %
Climax....dis 40 %

Harness Snaps.
Henshaw's....List of 1¼ changed to $14·00, dis 42½ %
Judd's " " 14·00, dis 50 %
Fitch's (Bristol) " " 14·00, dis 45 @ 50 %
Hotchkiss'....dis 10 %
Andrews'....dis 45 %
Sargent's....dis 60&10 %
New York Wire....dis 20&20 %
"German"....dis 60 %

Hatchets.—Isaiah Blood....dis 15 %
Shingling, Nos. 1 2 3....⅌ doz $7 25 8 00 8 75
Claw, " 1 2 3....⅌ doz 7 75 8 50 9 25
Lathing, " 1 2 3....⅌ doz 7 50 8 00 8 50
Hunt's....dis 25 %
Shingling, Nos. 1 2 3....⅌ doz $7 25 8 00 8 75
Claw, " 1 2 3....⅌ doz 7 75 8 50 9 25
Lathing, " 1 2 3....⅌ doz 7 50 8 25 9 00
Hurd's....dis 30&5 %
Shingling, Nos. 1 2 3....⅌ doz $8 00 8 50 9 00
Claw, " 1 2 3....⅌ doz 9 00 9 50 10 00
Lathing, " 1 2 3....⅌ doz 8 00 8 50 9 00
Newark's Edge Tool Co.'s....dis 25 %
Shingling, Nos. 1 2 3....⅌ doz $6 50 7 00 7 50
Claw, " 1 2 3....⅌ doz 7 25 7 75 8 25
Lathing, " 1 2 3....⅌ doz 6 50 7 00 7 50
Simmon's....dis 25 %
Shingling, Nos. 0 1 2 3....⅌ doz $7 50 8 00 8 50 9 00
Claw, " 1 2 3....⅌ doz 9 00 9 50 10 00
Lathing, " 1 2 3....⅌ doz 8 00 8 50 9 00
Broad, " 1 2 3....⅌ doz 9 00 10 00 12 00
" " 4 5 6....⅌ doz 14 00 16 00 18 00
" " 7 8....⅌ doz 20 00 22 00
D. R. Barton Tool Co....dis 20 %
Shingling, Nos. 1 2 3....⅌ doz $11 00 10 50 10 00
Lath, " 1 2 3....⅌ doz 10 50 10 00 9 50
Half Hatchets, Nos. 1 2 3...⅌ doz 11 00 10 50 10 00
J. P. Verree & Co....dis 5 %
Shingling, Nos. 1 2 3....⅌ doz $7 00 7 50 8 00
Claw, " 1 2 3....⅌ doz 7 50 8 00 8 50
Lathing, " 1 2 3....⅌ doz 7 00 7 50 8 00
Underhill's....dis 20 %
Shingling, Nos. 1 2 3....⅌ doz 7 25 8 00 8 75
Claw, " 1 2 3....⅌ doz 7 75 8 50 9 25
Lathing, " 1 2 3....⅌ doz 12 00 11 00 10 00
M. H. Jones & Co....dis 25 %
Shingling, Nos. 1 2 3....⅌ doz $8 00 8 50 9 00
Half Hatchets, Nos. 1 2 3....⅌ doz 8 00 8 50 9 00
Claw, Nos. 1 2 3....⅌ doz 9 00 9 50 10 00
Lathing, " 1 2 3....⅌ doz 8 00 8 50 9 00
Broad, " 2 3 4....⅌ doz 11 00 13 00 14 50
" " 5 6 7....⅌ doz 16 50 18 00 19 50
Empire Hatchets, M. H. Jones & Co....net
Shingling, Nos. 1 2 3....⅌ doz $4 75 5 00 5 25
Lath, " 1 2 3....⅌ doz 4 75 5 00 5 25
Half Hatchets, Nos. 1 2 3...⅌ doz 4 75 5 00 5 25
All pol. Sh'gling " 1 2 3...⅌ doz 5 25 5 50 5 75
Solid Steel Lath " 1 2 3...⅌ doz 7 25 7 50 7 75
Hay Knives.—"Lightning"....per doz $20·00 net
Wadsworth's....dis 30 %

Hinges.
Gate, Western....⅌ doz $6·25—dis 60&10 %
" N. E....⅌ doz 10·13—dis 60&10 %
Gate, N. Y. State....⅌ doz 7·20—dis 60&10&10 %
Gate, Clark's No. 1....per doz $6·00 dis 45 %
Rolled Plate....dis 60&10 %
Rolled Raised....dis 60&10 %
Wrought Strap and T....dis 60&5 %
Providence Plate. { 6 to 10 in. 11c ⅌ ℔; over 10 in. 9½c ⅌ ℔ } .... dis 40&10 %
Screw Hook and Strap.... { 5, 10, 12 in. 11 c; 14 to 36 in. 9½c } dis 40&10 %
Heavy Welded Hook.... { 8 to 12 in., 11 c; 14 in. & up, 9½c } ....dis 30 %
Screw Hook and Eye.... { ⅝ to 1 in., 11c; ⅜ in. 12½c; ¼ in. 13c } ....net

Hoes.
Solid Shank, C. S....⅌ doz $8 00—dis 40 %
Socket....⅌ doz 9 00—dis 40 %
Riveted Eye....⅌ doz 4 75—dis 40 %
Grub....dis 30 %
Planters....dis 20@25&10 %
Scovill Pattern....dis 20@30 %
Lane's C. S. Crescent Planters, Amer. Pattern.dis 20&5 %
" Scovill Pattern....dis 20 %
Handled Solid C. S. Shank....dis 35 %
Planters', Handled....dis 25 %
Scovill Pattern, Handled....dis 35 %

Hooks.
Bird Cage, Sargent's list....dis 60&10 %
Cotton....dis 50 %
Belt....dis 60&10 %
Bench—Hotchkiss' $5 00 ⅌ doz....dis 10 %
" Weston's No. 1, $8·00; No. 2, $7·00 per doz net
" McGill's....$3 00 per doz, dis 10 %
" Skinner's....per doz $6·25, dis 20 %
Clothes Line, Hart's list....dis 60&10&5&10 %
" " Sargent's list....dis 60&10&10 %
" " Reading list....dis 33⅓&5&10 %
Ceiling.. Harness. { Hart's list....dis 60&10&10 %; Sargent's list....dis 60&5&10 %; Reading list....dis 40&10 % }
Coat and Hat, Hart's list....dis 60&10&10 %
" " Sargent's list....dis 60&10&10 %
" " Reading....dis 40&10 %
Wrought Staples and Hooks and Staples....dis 75 %
" " Stanley's list....dis 40 %
Wire Screw Hooks and Eyes....dis 65&10&10 %
Grass....dis 30 %
Whiffletree—Patent....dis 45 %
Hooks and Eyes—Malleable Iron....dis 60&10&10 %
" " Brass....dis 60&10&10 %

Horse Nails.		Nos. 5	6	7	8	9	10
Ausable	⅌ ℔	30c	27c	26c	24c	23c	22c
" P't'd & Pol'd	"	31c	28c	26c	25c	24c	23c
" " & Blued	"	31c	28c	26c	25c	24c	23c
Cortland	"	29c	26c	24c	23c	22c	21c
Buffalo Forged	"	31c	28c	26c	25c	24c	23c
Globe, P't'd & Pol'd	"	31c	28c	26c	25c	24c	23c
National, Pointed and Polished, Pat. Fin	"	28c	25c	23c	22c	21c	20c
National, Pointed and Polished, Ex. Fin	"	30c	27c	25c	24c	23c	22c
Perkin's P't'd—Black	"	26c	23c	21c	20c	19c	18c
Perkins' Pointed and Polished	"	27c	24c	22c	21c	20c	19c
Perkins' Pointed and Blued	"	27c	24c	22c	21c	20c	19c
Putnam Hammer P't'd	"	32c	28c	26c	25c	24c	23c
Vulcan, P't'd & Blued	"	31c	28c	26c	25c	24c	23c

Star Brand, 16c.; Morgan....14c
Putnam....500 lbs., dis 5 %
Ausable, National and New London....1000 lbs., dis 5 %
Perkins' and Vulcan....1000 lbs., dis 7½ %
Perkins', Vulcan and Globe....500 lbs., dis 5 %

Horse Shoes.
Burden....⅌ keg. $3·92½
R. I. Horse Shoe Co., Perkins' Improved Light, Med. and Heavy....⅌ keg, 3·92½
Mule Shoes....⅌ keg, 4·92½
Perkins' Snow....⅌ keg, 4·92½
The Boston Horse Shoe....per keg $5·00
Boston Rolling Mills Hand Made....⅌ ℔ 8c

Ice Awls, Chisels, &c.
American Ice Chisel....per doz $6·50 net
National " "....per doz $6·50, dis 10 %
Novelty Ice Breakers....per doz $6·50, net
White's Sliding Head Picks....per doz $2·50, dis 25 %
Dunlap's Ring Picks....per doz $3·00, dis 20 %
Wood Head Picks, Sargent's....per doz $1·85, dis 60&10 %
Iron " "....per doz $1·85, dis 60&10 %
Ice Mallets, Pick in Head....per doz $1·75 net
" " Pick in Handle....per doz $3·00 net
Ice Axes Small. Cast or Malleable....per doz $1·50 net
Kitchen Ice Tongs....per doz $2·25 net

Kettles.
Brass....⅌ ℔ 45c net
Enameled....dis 55 %

Knives.
Ames' Butcher Knives....dis 20 %
" Shoe "....dis 15 %
" Bread "....⅌ doz $1·50—dis 15 %
Hay and Straw, "Wadsworth's"....dis 30 %
Table and Pocket....See Cutlery

Knobs.
Carriage (Jap'd 80 cents per gross)....dis 60&10 %
Base—Common....dis 30&10 %
" Plush Tip....dis 10 %
" Elastic End, No. 8....dis 60&5 %
Door, Mineral....⅌ doz $1·75; " Por. Jap'd....⅌ doz 2·25; " " Plated....⅌ doz 6·25; " " Por....⅌ doz 6·75 } ....dis 35 % & 2 % for cash
Furniture, Plain....75c gross inch, dis 10 %
" Wood Screws....dis 20 %

Ladles.
Melting, Hart's....dis 55&10 %
" Sargent's....dis 50&10 %
" Reading....dis 15&10 %
" Monroe's Patent....per doz $4·00 dis 20 %

Lanterns.
Tubular....No. 0, $11·00; No. 1, $14·00; With Guards, 50c. extra } dis 5 @ 10 %
Peerless....No. 5, per doz $11·75—dis 10&10 %
Brady's Patent....dis 10&10 %
Ætna....dis 10 & 10 %
Yankee....dis 10 & 10 %
De Beque....dis 10 & 10 %
Police....small, $7·50 large, $9·00, dis 5 %

Lard Presses.
Draw Cut, 14 inch....each $65 00—dis 20 %
Enterprise Mfg. Co....dis 20 %

Lemon Squeezers.
Porcelain Lined....per doz $7 00, dis 15 %
Eureka, Tinned....per doz, $10·00 dis 10 %
Dunlap's Improved....per doz $6·00 net
Sammis Patent....No. 1, $7·50; No. 2, $12·00 per doz., dis....25&10 %

Lines.
Linen Fish....dis 20 %
Cotton Chalk....dis 50 %
Sil. Lake Chalk....Nos. 0, 1, 2, 3, $6, 6·50, 7, 7·50, dis 20 %
Mason's....dis 20 %
Wire Clothes, Gal'd....each 50c. net

Locks and Latches.
Cabinet—Gaylord; " Eagle } ....dis 25&5&2 %
Trunk....dis 25 %
Langstroth & Crane's, List Jan. 1, '77.
Round Key....dis 40&10 %
Flat Key....dis 33⅓&10 %
Barnes & Deitz, Flat Key....dis 25 @ 30 %
Yale Lock Co., Flat Key....dis 40 %
Sargent & Greenleaf, Flat Key....dis 20 %
Continental....dis 25 %
Shepardson's, Flat Key....dis 35 %
American Lock Mfg. Co....dis 33⅓ %
Plate....dis 33⅓&2 %
Trenton; Branford; Norwich; Russell & Erwin; Norwalk; Nashua; Mallory, Wheeler & Co.; P. & F. Corbin; Parker & Whipple; Jacobus & Nimick Mfg. Co. } List of Jan. 1, 1877....dis 35 % ....and 2 % for cash
Padlocks, Russell & Erwin; " Mallory, Wheeler & Co.; " Wm. Wilcox & Co. } ....dis 33⅓&5 % ...and 2 % for cash
" American Lock Mfg. Co....dis 33⅓ %
" Romer's....dis 15 %
" Vulcan Hardware Co....dis 20 %
" New York Lock Co....dis 20 %
" J. H. McWilliams....dis 10 %
" Barnes & Deitz....dis 30 %
" Miller's Patent....dis 40 %
" Penn Lock Works....dis 58⅓ %
" " " " (Scandinavian)....dis 50 %
Mallets.—Hickory and Lignumvitæ....dis 20 %

Meat Cutters.
Dixon's (P. S. & W.).Nos. 1, 2, 3, 4; ⅌ doz. $14 00 $17 00 $19 00 $30 00 dis 25 %
Miles Challenge....Nos 1, 2, 3; ⅌ doz. $22·00 $30·00 $40 00—dis 30 %
Perry's..Nos. 1, 2, 3, 4, 4 g'rd, 5 g'rd; Each $3·00 $4·00 $5·00 $11·00 $18·00 $36·00—dis 40 %
Woodruff's (P. S. & W.)....Nos. 100, 150; ⅌ doz. $15·00 $18·00—dis 25 %
Hales'....Nos. 11, 12, 13; ⅌ doz. $27·00 $33·00 $42·00—dis 40&2 %
Draw Cut..Nos. 5, 2, 6, 8, 10; Each $50·00 $75.00 $80·00 $225 00 $400·00—dis 20 %
American....dis 25 %
No.... 1, 2, 2½, 3, 4, B, 5; Each....$5·00 $7·50 $10·00 $12·00 $25·00 $50·00 $60·00

Molasses Gates.
Stebbins' Pattern....dis 62½&10 %
" Genuine....dis 60&10 %
" Tinned ends....dis 40&10 %
Bush's....dis 20 %
Lincoln's Genuine....dis 62½&10 %
Weed's....dis 15 %

Mortars and Pestles.
Iron....net
Mortising Machines....each $30·00, dis 20 %

Nail Pullers.
Taft's....per doz $24·00 net
Nails.....See Trade Report

Nuts and Washers.
Square and Hex., New List March 1, '76...7 @ 7½c off list

Oakum.
Best....⅌ ℔ 10½c
U. S. Navy....⅌ ℔ 9½c
Navy....⅌ ℔ 8½c

Oilers.
Zinc and Tin....new list, dis 45 %
Brass and Copper....new list, dis 40 %
Olmsted's....dis 40 %
Broughton's....dis 40 %
Malleable....per doz $5 00 dis 10 %
Prior's Patent or "Paragon"....dis 45 %
Ox Balls....dis 60&10 %

Pencils
Faber's Carpenters'....net
" Round Gilt....⅌ gross $6 00 net
Dixon's Lead....⅌ gross $4·50 net
" Lumber....⅌ gross 9·00 net

Picture Cord (Wire).
Tinned (Williams, White & Churchill)....dis 80 %
Lacquered " " "....dis 80 %
Gold Plated " " "....dis 70 %

Picture Nails and Knobs.
Brass Head....Sargent's List, dis 60&10 %
Porcelain Head....Sargent's List, dis 60&10&10 %
Pinking Irons.....per doz $2 75—dis 65&10 %

Plaiting Machines.
Astor Plaiting Machine....each $15·00; dis 20 %

Planes and Plane Irons.
First Quality....dis 35 @ 30&10 %
Second Quality....dis 50 %
Bailey's Patent Adjustable, new list Jan. '77. dis 25&10 %
Bailey's "Victor" " "....dis 25&10 %
Defiance Adjustable, new list....dis 25&10 %
D. R. Barton Tool Co....dis 20 %
Sandusky....dis 35 %
Ohio Tool Co....dis 35 %
Plane Irons, Butcher's....$5 50 to £ gold—new list
" Buck Bros....$5 25 to £ gold
" Bailey's Patent....dis 25&10 %
" Auburn Tool Co.'s....dis 25 %
" Greenfield Tool Co....net list
Plane Irons, Defiance....new list dis 25&10 %
" D. R. Barton Tool Co....dis 20 %
" Middletown Tool Co....net list
" Ohio Tool Co....dis 10 %
" Spear & Jackson's....5 00 to £ gold
" Sandusky Tool Co....dis 10 %
Plow Bits, Greenfield Tool Co....dis 10 %

Pliers and Nippers.
Button's Patent....dis 33⅓ %
Hull's Patent Nippers..No. 1, $15; No. 2, $21 ⅌ doz dis 25 %
Gas Pliers....dis 25 %
Eureka Pliers and Nippers....dis 25 %

Plumbs and Levels.
Stanley R. & L. Co.'s Pat. Adjustable....dis 60&10 %
" " " Non-Adjustable....dis 60&10 %
Chapin's....dis 60&10 %
Standard Rule Co.'s New Adjustable....dis 60&10 %
Standard Rule Co.'s Non-Adjustable....dis 60&10 %
Johnson's Patent Adjustable....dis 60&10 %
Davis' Patent....dis 60&10 %
Pocket Levels....dis 60&10 %

Post Hole and Tree Augers.
Eureka Digger....per doz $40·00, dis 20 %
Fletcher Post Hole Augers....per doz $36·00, dis 20 %
Vaughan's Post Hole— 6 in. $23 60; 7, 8 and 9 in. $25 per doz....dis 20 %
Leed's....$5 00 each—dis 35 %

Potato Parers, &c.
Bay State....⅌ doz $12·00 net
"Saratoga" Peeler and Slicer....⅌ doz 9·00 net

Pulleys.
Judd's Axle....per doz $0·75 dis 40 %
Hot House and Tackle....dis 60&10 %
Jap'd Screw....dis 60&10 %
Brass Screw....dis 60&10 %
Jap'd Side....dis 60&10 %
" Clothes Line....dis 60&10 %
Hay Fork....per doz $4 50 @ 5 00, dis 10 %

Pumps.
Douglas Cistern, etc....new list dis
" S. & F....new list dis
Union Mfg. Co's. Cistern and Pitcher....dis 35 %
" " " Rams....dis 25 %
" " " Garden Engines....dis 20 %

Punches.
Belt or Drive....per doz $2·00; $2·25; $2·50 dis 30
Spring....per doz $6·50—dis 25&10 %
" Leach's Patent....dis 15 %
" Bemis'....dis 20 %

Rail.
Sliding Door, Wrought Brass....⅌ ℔ 40c. net
" " Iron, Painted....⅌ foot 9c—dis 55&10 %
Barn Door, ½, ⅝ and ¾ inch....dis 65&10 %
" " for N. E. Hangers....dis 65&10 %

Rakes.
Cast Steel....dis 35 %

$8 00	9 00	10 00	11 00
8	10	12	14 teeth.

Malleable....dis 40 %

$5 00	5 50	5 50	6 00	6 00	6 50
9	10	11	12	13	15 teeth.

Razor Straps.
Evan's....dis 40 %
Imitation Emerson....⅌ doz $2·75—dis 40&10 %
Hunt's....dis 40&5 %
Chapman....dis 10 @ 15 %
Torrey's....dis 20 %
Saunder's....net @ 10 %

Rivets.
Iron and Tinned....dis 40 %
In bulk....dis 30 %
Copper Rivets and Burrs....dis 10 %

Nos.	7	8	9	10	11	12	13	14	15
Per lb.	48c	50c	52c	54c	56c	58c	60c	65c	70c

Rivet Sets....dis 20 %

Road and Levee Scrapers.
Doty's Revolving....dis 25 %

Rods.
Stair....dis 50 %
" American Patent....dis 33⅓ %

Rollers.
Barn Door....revised list dis 65&10 %
Novelty....dis 10 %
Acme (Anti-friction)....dis 40 %

Rope. Manufacturers' List of May 4, 1877
Manila....⅝ inch and larger ⅌ ℔ 14½c
"....⅜ inch ⅌ ℔ 15 c
"....¼ and 5-16 inch ⅌ ℔ 15½c
" Tar'd Rope....⅌ ℔ 14 c
" Tar'd Lath Yarn....⅌ ℔ 15½c
" Hay Rope....⅌ ℔ 14½c
Sisal....⅝ inch and larger ⅌ ℔ 11 c
"....⅜ inch ⅌ ℔ 11½c
Sisal....¼ and 5-16 inch ⅌ ℔ 12 c
" Hay Rope....⅌ ℔ 11 c

Rules.	Boxwood.	Ivory.
Chapin's	dis 55&10 %	dis 45&10 %
Stanley	dis 55&10 %	dis 45&10 %
Standard	dis 55&10 %	dis 45&10 %
Stephens'	dis 55&10 %	dis 45&10 %
Willis, Thrail & Son	dis 55&10 %	dis 45&10 %

Sad Irons.
From 4 to 10 lbs....⅌ ℔ 3 @ 3½c net
Sad Iron, Nickel Stand attached....⅌ ℔ 9c
Self-Heating....per doz $9·10 @ 9·25 net
" " Tailors....per doz $19·00 net
Mrs. Potts....dis 20 %
Combined Fluter and Sad Iron....per doz $15·00 dis 15 %

Sand Paper.
Baeder & Adamson's Flint, 00 to 1½...$4 25 ⅌ ream; " " " 2, 2½ & 3. 4 75 "; " " " Assorted. 4 25 "; " " Star....⅌ ream $3 25; " " Emery...⅌ ream $6 50 @ 11 50 } dis 15 %
New England, same list as B. & A. Flint....dis 15 %
H. B. & M. Roman Flint " " "....dis 15&5 %

Sash Cord.
Common....⅌ ℔ 16 @ 18c. net
Patent....⅌ ℔ 22½c. net
Silver Lake, Russia Flax....⅌ ℔ 55c; " " White Cotton....⅌ ℔ 55c; " " Drab Cotton....⅌ ℔ 60c } net
Raw Hide....dis 25 %

Sash Locks.
Clark's, Nos. 1, $10·00 No. 2, $8·00 per gross....dis 40 %
Ferguson's....dis 40 %
Norwich....dis 25 %
Walker's....dis 10 %
New England....dis 20 %
Hammond's Window Springs....dis 25 %
Sash Weights.—Solid Eyes....⅌ ℔ 1½c

Sausage Stuffers or Fillers.
Miles....⅌ doz $20—dis 30 %
Perry....⅌ doz No. 11, $15; No. 10, $21—dis 30 %
Draw Cut No. 4....each $30 00—dis 20 %
Enterprise Mfg. Co....dis 20 %
Silver's....dis 25 %
Saw Frames....per gross $18 00—dis 15&10 %
Saw Rods....$10 list, dis 10&10 %

Saws.
Spear & Jackson's....$3 50 to £ gold
Disston's Circular....dis 25 %
" Mill....dis 30 %
" Cross Cut....dis 20 %
" Hand, Panel, Rip, &c....dis 20 %
H. W. Peace's Circulars....dis 25 %
" Mill, Gang and Mulay....dis 25 %
" Cross Cut, Wood, Hand, &c....dis 20 %
E. M. Boynton's Lightning, Cross Cuts....dis 50&5 %
" " One-Man, all lengths....dis 40&5 %
" " Buck Saws (X Bar).⅌ doz $15, dis 40&10 %
" " Billet Webs....per doz $10, dis 40&5 %
" " Pruning....dis 40 % } 5 % cash.
Wheeler & Clemson Mfg. Co.'s Hand....dis 15 %
" " " " Cross-Cut....dis 30 %
Livingston's Butcher and Kitchen....dis 20 @ 25 %
Livingston's Framed Wood—

Nos.	101	102	103	104	105
Per doz	$10·00	8·75	10·00	7·50	6·25 net

Saw Sets.
Boynton's Patent....dis 40 %
Stillman's Genuine....⅌ doz $4·25 net
" Imitation....⅌ doz 3·25—dis 25 %
Common Lever....per doz $3·00 dis 25 %
Leach's....No. 0, $5·00; No. 1, $15·00 dis 15 %
Nash's....No. 1, $8·50; No. 2, $5·50 dis 20&10 %
Hammer, Hotchkiss....$5·50 dis 10 %
" Bemis & Call's....dis 20 %
" Aiken's Genuine....$13·00 dis 33⅓&10 %
" " Imitation....$7·00 dis 25&10 %
" Hart's Patent Lever....dis 20 %

Scales.
Hatch, Counter....⅌ doz $36—dis 33⅓ %
" Tea....⅌ doz $15—dis 40 %
Union Platform....$6·00, $7·00—dis 40 %
Turnbull's....dis 20 @ 25 %
Brown's....dis 25&5 %
Fairbanks'....dis 20&5 %
Howe's....dis 20&5 %
Chatillon's Grocers'....dis 25 %
" Eureka....dis 20 %
Universal Family....dis 25 %
Favorite Family....dis 25 %
Scale Beams.
No. 1 300 to 1200 lbs....90c ⅌ cwt; No. 2 " "....75c ⅌ cwt } dis....40 %

Scrapers.
Box, 1 Handle....per doz $3·00, dis 10 %
" 2 "....per doz 6·00, dis 10 %
Defiance Box and Ship....dis 25&10 %
Foot....dis 60 & 10 %
Ship (common)....per doz $3 00 net
Ship—Providence Tool Co....dis 10 %

Screw Drivers.
Hart, Bliven & Mead....dis 55&10 %
Douglass Mfg. Co....dis 35&10 %
" " No. 1....dis 30&10 %
Disston's....dis 45 %
Stanley Rule & Level Co., No. 1....dis 35&10 %
" " " No. 2....dis 45&10 %

Screws.
Flat H'd Iron, list Sept. 1, '75, R.&E. Mfg. Co....dis 60 %
" " " Am. Sc. Co....dis 60 %
Round Head Iron " "....dis 50
Flat Head Brass, list Sept. 1, '75, Am. Sc. Co....dis 55 %
Round Head Brass, list Sept. 1, '75, Am. Sc. Co....dis 40 %

Brass and Silver Capped, List March 1, '75... dis 40 %
Lag or Common Coach, New List March 1, '76... dis 65 %
Coach, Patent Gimlet Point, List Jan. 1, 1875... dis 40 @ 50 %
Bed... dis 10 %
Japanned, List of Plain Screws... dis 35 %
Machine—Flat Head, Iron, Am. Screw Co... dis 10 %
Round Head, Iron, " " ... net
Nettlefold's Brass... dis 60 @ 60&5 %
Bench—Iron... dis 60, 10&10 %
" —Wood, Beach... ℘ doz $8·00 net
" " Hickory... dis 20&10 %
Hand... dis 25&10 %
Hand Rail, Sargent's... dis 55&10 %
" " Humason, Beckley & Co.'s... dis 40&5 %
Jack—Bell Bottom... dis 15 %

Scythes

Blood's German Steel, Grass	℘ doz $10 00	dis $1·50 from list
" Cast " "	℘ doz 11 00	
" Silver " "	℘ doz 12 00	
" German " Grain	℘ doz 14 00	
" Cast " "	℘ doz 15 00	
Blood's Excelsior and Granger	℘ doz 11 00	dis $1·50 from list.
" Young America	10 50	
" Silver Clipper	13 00	

Wadsworth's Grass... dis 30 %
" Bush... dis 20 %
Scythe Snaths... dis 20 %

Shears and Scissors.

Cast Steel... dis 75&10 %
Cast Iron... dis 40 %
Seymour's Straight Trimmers... dis 60&10 %
" Scissors... dis 50 %
Pruning... per doz $5·50 @ 6·00, net
Barnard's Lamp Trimmers... per doz $3·75

Sheaves.

Sliding Door, M. W. & Co. list... dis 35&2 %
" R. & E. list... dis 50&5&2 %
" Patent Roller... dis 25&2 %
" " " Hatfield's... dis 50&2 %
Russell's Anti-Friction... dis 50&2 %
Sliding Shutter, R. & E. List... dis 50&5&2 %
" " Sargent's List... dis 55&10 %
Moore's Anti-friction... dis 33⅓ %

Shovels and Spades.

Ames... dis 30 %
Rowland's... dis 50 %
Old Colony... dis 30 %
Middleboro' Shovel Co... dis 30 %
Remington's (Lowman's Patent)... dis 30 %
Dunning's Shovels and Scoops... dis 20&7½ %

Shovels and Tongs.

Iron and Brass Head, R. & E. list... dis 50&10&2 %
" " Hart's... dis 55&2&10 %
Polished Steel... dis 50&10&2 %

Slates.

Square Frames, Round Cornered, by case... dis 70 %
Less than a case... dis 65&10 %

Spokes.—North Carolina Handle Co... dis 20 %

Spoke Shaves.

Defiance Metallic... new list dis 25&10 %
Iron... dis 33⅓&10 %
Wood... dis 30 %
Bailey's... dis 25&10 %

Spoke Trimmers.

Bonney's... per doz $10·00 dis 40 %
Stearn's... per doz $10·00 dis 40 %
Ives'... No. 1, $15·00; No. 2, $12·00 ℘ doz, dis 33⅓&10 %
Douglass'... per doz $9·00 dis 25&10 %

Spoons.

Tinned Iron... dis 10 %
By the case... dis 20 %
Basting... dis 10 %
Britannia... dis 55 @ 60 %
" Boardman's... dis 55 %
Derby Silver Co... dis 40&5 %
Rogers & Bro., A 1... dis 40&5 %
Reed & Barton... dis 40&5 %
Rogers Cutlery Co... dis 50 %
Hall & Elton... dis 40&5 %
Holmes, Booth & Haydens... dis 40&5 %
Nickel Silver Co... dis 30 %
German Silver (Hall & Elton)... dis 25&5 %
Tin (P. S. & W.)—
Teas... $1·50 ℘ gross, net
Tables... 2·75 " net
Tin (Cowles Hdw. Co.)... dis 10 %
" " " case lots... dis 20 %

Stencil Combinations.—Stafford Mfg. Co.—

Inch	½	¾	1	1¼	1½	2	2½
Per doz.	$6·00	6·50	7·00	9·00	10·00	14·00	18·00

Stocks and Dies.... dis 5&10 %

Stone.

Hindostan Stone... ℘ ℔ 6c } dis 25&10 %
" Axe Stone... ℘ ℔ 8c
" Slips... ℘ ℔ 10c
Sand Stone... ℘ ℔ 6—dis 25&10 %
Washita Stone... No. 1, ℘ ℔ 30c net
" ... No. 2, ℘ ℔ 25c net
" Slips... No. 1, ℘ ℔ 60c net
Arkansas Stone... No. 1, ℘ ℔ $1·35 net
" Slips... No. 1, ℘ ℔ $2·50 net
Grindstones, Family, Loring's... dis 10 %

Stove Polish.

Joseph Dixon's... ℘ gross, $6·00 dis 5 %
Gem... ℘ gross $4·50 dis 5 %
Gold Medal... ℘ gross $6 00 dis 25 %
Rising Sun... per gross $5·75 net

Squares.

Steel... dis 50 %; full cases, dis 50&10 %
Iron... dis 50 %; full cases, dis 50&10 %
Nickel Plated... add $2 50 @ $4 00 ℘ doz net
Try Squares and T Bevels... dis 45&10 %
Star Try Squares and Bevels... dis 35 %
Disston's Try Squares No. 1... dis 30 %
" " No. 2... dis 45 %
" " Improved, Nos. 1 & 2... dis 30 %
Winterbottom's Try and Mitre... dis 20&10 %

Tacks, Brads, &c.—List of January 1, 1876.

Tacks, Half Weight, American... dis 75& } dis 10 % for cash
" Full " "... dis 50&
" Half " Swedes... dis 65&
" Full " "... dis 30&
" Carpet, Am. and Swedes... dis 10&
" " Leather Head... dis 10&
" Copper... ℘ ℔ 45c. dis
Brads, Half Weight... dis 50&
Shoe Nails—
4-8ths and longer, 9c.; 3½-8ths, 9½c. ℘ ℔, dis 10 %
Trunk, Clout and Finishing Nails—

⅜	½	⅝	¾	1	1¼ in. and over.
25	20	17	15	13	11c. ℘ ℔, dis 10 %

Double Pointed Tacks... dis 40&5 %

Tap Borers.

Common and Ring... dis 25&10 %
Ives' Tap Borers... dis 10&10 @ 25 %
Enterprise Mfg. Co... dis 20 %

Tapes, Measuring.

American Flask and Cap Co... dis 30 %
Eddy's... dis 30 %

Tea Trays.

American Tea Tray Co... dis 15 %

Thermometers.

Tin Case... dis 60&10 %

Tobacco Cutters.

Enterprise Mfg. Co. (Champion)... dis 20 %
Wood Bottom... per doz $12—dis 30&10 %
All Iron... per doz $14·50—dis 40&5 %
Nashua Lock Co.'s... per doz $18 00—dis 30 %

Toe Calks.

Winsted... ℘ ℔ 10c., dis 5 @ 7½ %

Tinners' Tools and Machines.

P. S. & W... dis 10 %

Traps.

Game, Newhouse... dis 25&2 %
" Peck, Stow & Wilcox... dis 45 %
" Hotchkiss... old list dis 45 %
" Blake's Patent... dis 40 %
Mouse, Wood Choker... ℘ doz holes, 15 @ 16c
" Patent Choker (Union Nut Co.)... ℘ doz holes 16 @ 18c net
" Round, Wire... ℘ doz $1 50 to 2 00 net
" Square, "... ℘ doz 2 00 to 2 50 net
" Cage, "... ℘ doz 2 50, dis 10 %
" Patent Self Setting... per doz holes 25c net
" Catch-em-alive... ℘ doz $4·00 net

Trowels.

Lothrop's Brick and Plastering... dis 10 %
Disston's Brick and Plastering... dis 20 %
Peace's Plastering... dis 20 %
Clement & Maynard's... dis 20 %
Rose's Brick... dis 5 %
Brades' Brick... gold, dis 10 %
Worrall's Brick and Plastering... dis 20 %
Garden... dis 25 %

Triers.

Butter and Cheese... dis 25 %

Ventilators (Window).

Nickel and Gilt... per dozen $16·00 @ 18·00

Vises.

Solid Box, Trenton... 40 to 160 lbs., 12½c. net
" " Wilson's... 30 to 160 lbs., 18c; 160 and over, 22c } dis 33⅓ %
" " Peter Wrights... 16c gold
Parallel, Parker's... dis 20 %
" Wilson's... dis 30&10 %
" Sargent's... dis 55&10 %
" Trenton... dis 30 %
" Backus and Union... dis 25 %
" Merrill's... dis 15 %
" Fisher & Norris... dis 15&10 %
" Buffalo... dis 25 %
" Stevens'... dis 25 %
" Simpson's Adjustable... dis 25 %
Saw Filers, Bonney's... per doz $20·00 dis 25 %
" Stearn's... per doz $20·00 dis 25 %
" Hopkins'... per doz $17·50 dis 10 %

Wheel Barrows.

Canal (Pugsley & Chapman)... new list dis 30 %
Coal, Garden and Stone (Pugsley & Chapman)... dis 30 %
Jacob's Pat. Self-Oiling R. R. and Canal... dis 25 %

Well Wheels.—Revised list... dis 60&10 %

Wire.

Brass and Copper... List of Jan. 1, 1877, dis 10 %
Bright and Annealed... Nos. 0 @ 18 dis 52½ @ 55 %
" " ... " 19 @ 26 dis 57½ @ 60 %
" " ... " 27 @ 36 dis 60 @ 62½ %
Coppered... " 0 @ 18 dis 47½ @ 50 %
Galvanized, Nos. 0 to 6... ℘ ℔ 8c net
Galvanized, Nos. 7 to 18... market list dis 25 %
Tinned Nos. 0 to 18... dis 33⅓ @ 35 %
Cast Steel... dis 20 @ 25 %
Tinned Broom Wire, Nos. 18 to 25... dis 42½ @ 45 %
Galvanized Telegraph, Nos. 8 and 9... ℘ ℔ 9c
Galvanized Telegraph, Nos. 10 and 11... ℘ ℔ 10c
" " 12... ℘ ℔ 10½c
Annealed Fence, Nos. 8 and 9... dis 55 %
" Grape, " 10 to 14... dis 55 %
Fence Staples... ℘ ℔ 7 @ 7½c
Fence Staples Galvanized... ℘ ℔ 10c
Stubs' Steel Wire... $7 00 to $ gold
Japanned Barb Fence... ℘ ℔ 15c
Galvanized "... ℘ ℔ 18c
Steel Music Wire, Nos. 12 to 27... ℘ ℔ 10c
Judd's Picture Wire... dis 50 %
Clothes Line Wire, Galvanized... per coil 45 @ 50c. net

Wrenches.

American Adjustable... dis 45 %
Baxter's Adjustable "S" New List, May 1, '76... dis 20 %
" Diagonal... dis 20 %
Collins & Co.'s... dis 45 %
Coes' Genuine... dis 50&5 %
" Pattern (Wrought)... dis 20&10 %
" " (Malleable)... dis 75 %

Hull & Belden's "Climax"... dis 25 %
Knight's Patent... dis 25 %
Lindsay's Patent... dis 25 %
Taft's Pattern... dis 75&10 %
Davis Patent Duplex... new list dis 25 %
Bemis & Call's Patent Combination... dis 20&5 %
" " Merrick's Pattern... dis 25&2½ %
" " Brigg's Patent... dis 20&5 %
Aiken's Pocket (Bright)... $8·00, dis 40 %

Wringers. Per doz.

Universal, without Cog Wheels... $54·00
" with Cog Wh'ls, No. 2½, small fam'y size 63·00
" " " No. 2, usual 66·00
Crown No. 2... 57·00
" No. 3... 69·00
Climax No. 2... $71·00 } Less $2·00 per doz. for cash before shipment.
" No. 1½... 79·00
XXX Universal No. 2... 71·00
" " No. 1½... 79·00
Household, no Cog Wheels... 54·00
Sherman, with "... 63·00
Eureka, no "... 60·00
Reliance, with "... 63·00
Novelty, No. 10, with Cog Wheels... 63·00
" No. 2, " "... 66·00
" No. 22, " "... 70 00
Excelsior, No. A, with folding bench... 84·00
" No. E, for set tubs... 72·00
Keystone No. 1, Wood Frame, no Gear... 56·00
" No. 2, Iron Frame, no Gear... 54·00
" No. 2½, Wood Frame, Purchase Gear... 66·00
" No. 3, Iron " "... 63·00
" No. 1½, Wood Frame, Common Gear... 63·00

Stamped Tin Ware.

Common Stamped Ware... dis 20 %
Stamped Deep and Retinned Ware... dis 33⅓ %
Japanned Tin Ware... dis 5 %
Planished Tin Ware... dis 20 %

METALS.

IRON.—Duty Bars, 1 to 1½ cents per lb., Sheet, Band, Hoop and Scroll, 1½ to 1¾ cents per lb. Provided, that none of the above Iron shall pay a less rate of duty than 35 per cent. Pig, $7 per ton; Polished Sheets, 3 cents per lb.; Wrought Scrap, $8 per ton; Cast Scrap, $6 per ton. Railroad, 70 cents per 100 lbs. Boiler and Plate, 1½ cents per lb.

Pig Iron—American.

Foundry No. 1... ℘ ton, $18 00 @ 19 00
Foundry No. 2... " 17 00 @ 18 00
Gray Forge... " 16 00 @ 17 00

SCOTCH.

Glengarnock... " 27 00
Eglinton... " 25 00
Coltness... " 28 50

Bar Iron.

Am. Refined, at mill... 2·10c @ 2·25c.

Rails.

Iron, at mill... ℘ ton $33 00 @ 36 00
Steel, "... " 45 00 @ 47 00
Old Rails... " 19 00

Scrap.

Wrought Scrap, from yard... " 24 00

Bar Iron from Store.

Common Iron.
⅜ to 2 in. round and square... } ℘ ℔ 2·1c
1 to 6 in. x ⅜ to 1 in... }
Refined Iron
⅜ to 2 in. round and square... } ℘ ℔ 2·8c
1 to 6 in. x ⅜ to 1 in... }
1 to 6 in. x ¼ and 3-16... ℘ ℔ 2·5c
Rods—⅝ and 11-16 round and square... ℘ ℔ 2·4c
Bands—1 to 6 x 12 to 3-16... ℘ ℔ 2·7c
Swedish Iron.
Ordinary sizes... 130 00 @ 132 50
Plow size...

Sheet Iron.

	Common American.	R. G. American.
Nos. 10 to 20... ℘ ℔	3¼	4½c
21 to 24... "	3⅜c	4½c
25 to 26... "	3⅜c	4⅜c
27... "	4 c	5 c
28... "	4 c	5½c

Galvanized, 14 to 20, prime, ℘ ℔ 7½c; 2d quality ℘ ℔ 6 c
" 21 to 24 " " 8 c " ... " 6½c
" 25 to 26 " " 8½c " ... " 7 c
" 27 " " 9 c " ... " 7½c
" 28 " " 9½c " ... " 8 c
Patent Planished... A, 11c.; B, 9½c. ℘ ℔
Russia, Nos. 8 to 16... ℘ ℔ 12½ @ 13c
" Stained, No. 1... " 12c
Am. Cold Rolled... " 4½c
One piece Corrugated Sheet Iron Elbows.

CHARCOAL IRON.

⅜	5	5½	6	7 inch.
$2·50	3·50	4·50	5·25	6·50 per doz.

RUSSIA IRON.

4½	5	5½	6	7 inch.
$5·00	7 00	9·50	12·00	14·00 per doz.

COPPER—Duty. Pig, Bar and Ingot 5c.; old copper, 4 cents ℘ ℔; Manufactured (including all articles of which copper is a component of chief value) 45 % ad valorem.

American Ingot... ℘ ℔ 20 @ 20½c
English "...

SHEATHING, BRAZIERS COPPER, BOLTS, &C.

Braziers Copper, ordinary sizes, over 16 oz., per square foot... 32c ℘ ℔
Braziers Copper, ordinary sizes, 16 oz. and over 12 oz., per square foot... 34c. "
Braziers' Copper, 12 oz. per square foot... 36c. "
Circles less than 84 inch in diameter... 35c
Circles, 84 inch diameter and over... 38c. "
Segment and Pattern Sheets... 35c. "
Locomotive Fire Box Sheets... 32c. "
Sheathing Copper, over 12 oz. per sq. ft... 31c. "
" " 12 oz. ℘ sq. ft. and lighter... 36c. "
Bolt Copper... 32c. "
Copper Bottoms, 32c. ℘ ℔... net
No Copper is Sheathing except 14x48 inches, and not to exceed 34 oz. to the square foot.
Sheathing Copper, tinned on one side, by the case... 6c. ℘ sheet
For less than a case... 8c ℘ sheet
Tinning Sheets, ordinary sizes... 2½c. ℘ sq. ft
For tinning both sides double the above amount.

O'NEILL'S PATENT PLANISHED COPPER.

14x48.

14 and 16 oz. and heavier... 37c. By the case, 36c. ℘ ℔
12 oz. and lighter... 40c. " " 39c. "

Boiler Sizes.

7 in., 14x52. 8 in., 14x56. 9 in., 14x60
14 and 16 oz. and heavier... 39c. By the case, 38c. ℘ ℔
(And all sizes not over 20 inches wide.)

30x60

14 and 16 oz. and heavier... 41c. ℘ ℔
12 oz... 44c. "

Brass.

Brown & Sharp's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

BRASS MANUFACTURERS' PRICE LIST.

January 1, 1877.

Cash prices for Roll and Sheet Brass. For less quantity than 100 pounds, add 3 cents per pound.

HIGH BRASS

All Nos. not thinner than to No. 28, wider than 2 in., not wider than 14 in... 30c.
All Nos. to No. 28, inclusive, and widths over 14 to 20 in., inclusive... 34c
All Nos. to No. 28, inclusive, and widths over 20 to 30 in. inclusive... 37c
½c. ℘ ℔ advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 38 is Platers' Brass, at... 50c
Sheets 24x48 in., and all sheets cut to particular sizes and lengths under 30 in., in width wider than 2 in... 37c
Printers' Rules... 44c
Sheets wider than 30 in. and under 40 in... 45c
" " " 40 in. and over... 47c
Circular sheets, in diam. from 4 in. to 14, inclusive... 41c
" " " over 14 " 20, "... 45c
" " " " 20 " 30, "... 48c
" " " " 30 " 40, "... 51c
" " " " 40 in... 54c

LOW BRASS.

Four cents ℘ ℔ more than High Brass.
Gilding Metal 2c, ℘ ℔ more than High Brass.
Platers' or Gold Metal { In Bars... 46c; Sawed... 49c; Planed or Polished... 52c

FOR SLITTING.

Metal in width 2 in. to ⅛ in. to No. 28, inclusive, per ℔. advance.
Metal, in width 2 in. to 1 in., thinner than No. 28, 2c. per ℔. advance.
Metal, in width 1 in. to ⅛ thinner than No. 28, 3c. per ℔. advance.
Metal, in width ⅛ in. to ¼, inclusive, not thinner than No. 28, 2c. per ℔. advance.
Metal, in width ⅛ in. to ¼ thinner than No. 28, 5c. per ℔. advance.
Metal, ¼ in. in width and less, 10c. per lb. advance
Any of the above widths cut to particular lengths, add 7c. per pound.

GERMAN SILVER MARKET METAL AND WIRE.

	Market Metal.	Wire.
4 per cent., 12 in., to No. 26...	$0·60	$0·85
6 " " "	·68	·96
10 " " "	·84	1·15
15 " " "	1·04	1·40
18 " " "	1·16	1·55

German Silver Sheets over 12 in. wide, and weighing more than 16 ℔s., $2·25 per ℔.

Advance 2c. for each additional in., in width above 12 in., and 3c. per ℔. on each No. thinner than Nos. 26 to 36 inclusive.

All German Silver thinner than No. 36 is Platers' at 50c. per ℔. additional.

German Silver Scrap one-third less than net price of 12 in. Market Metal. German Silver Turnings, Filings and Chips, half the price of Scrap.

BRASS AND COPPER WIRE.

	High Brass.	Low Brass.	Gild'g and Cop'r.
No. 0 to 20	$0·34	$0·38	$0·45
No. 21	·35	·39	·46
No. 22	·36	·40	·47
No. 23	·37	·41	·48
No. 24	·39	·43	·50
No. 25	·42	·46	·53
No. 26	·44	·48	·55
No. 27	·46	·50	·57
No. 28	·49	·53	·60
No. 29	·52	·56	·63
No. 30	·55	·59	·69
No. 31	·59	·63	·75
No. 32	·63	·67	·81
No. 33	·67	·71	·90
No. 34	·71	·75	1·00

Spring Wire 2c. per ℔. advance.

Flat, Square and Half Round Wire, 5c. per ℔ advance on Round Wire.

Fancy Wire not less than 10c. per ℔. advance of Round Wire.

Brass Rods, No. 8 and smaller not less than 2 feet lengths, 45c.

Wire straightened and cut, smaller than No. 8, and not less than 2 feet lengths, 40c.

Wire and Rods less than 2 feet lengths, special rates.

Twelve cents per ℔. extra for spooling on 1 ℔. spools.

MISCELLANEOUS.

Common Plain Brass Pail Ears... $0 44
Brass Door Rail... ·45

SCRAP.

High Brass Scrap, 16 cents.
Low " 18 cents.
Gilding, 20 cents.
Turnings, Filings and Chips ... the price of Scrap.
Terms—Net cash. Interest ... be added after thirty days.

TUBING. ℘ ℔

Plain to No. 20 inclusive, above ⅛ in. to 3 in... $0·40
" above 3 in... ·50
Nos. 21, 22, 23, two cents advance on List for each Number.
Nos. 24, 25, 26, four cents advance on List for each Number.
Above No. 26 special rates.
Plain ⅛ inch... ·78
" 3-16 "... 1·10
" ¼ "... 1·60
All Mandrel Drawn Tubes, 5 cents advance on List Prices.
Fancy Tubing to No. 20... 48c
English, Scotch and Extra Patterns Fancy Tubing to No. 20... 53c
Tubing Sawed or Cut 2 to 4 feet long, 2 cents advance on List.
Add to 2 cents ½ cent for each additional cutting under two feet.
All Mandrel Drawn Tubes under ⅜ in., 25 cents per pound advance.

ZINC TUBING.

Plain... ·28
Fancy... ·31
Scotch and Extra Patterns... ·34

GERMAN SILVER TUBING.

4 Per cent... ·85
6 "... ·96
9 "... 1·10
12 "... 1·25
15 "... 1·40
16 "... 1·45
18 "... 1·55
20 "... 1·56

STEEL.—Duty: Bars, Ingots, Sheets and Coils, valued at 7 cents per lb., or under, 2¼ cents; over 7 cents, and not above 11, 3 cents per lb. over 11, 3¼ cents per lb. and 10 % ad val. Railway Bars 1¼ cents per lb. Railway Bars, in part Steel, 1 cent per lb. Provided, that Metal cemented, cast or made from iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as

American Cast Steel.

Tool... 15 @ 16c
Spring... 10c
Homogeneous... 12½c
Tire... 12½ @ 13½c
Machinery (round and square)... 10 @ 11c
File... 11c
Sheet... 14 @ 16c
Saw Plate, mill and mulay... 14 @ 16½c
Saw Plate, gang and X cut... 13 @ 14c
" circular as to size... 18 @ 30c

Chrome Steel.

Tool... ℘ ℔ 20 @ 21c
Tool, extra fine... " 40 @ 75c
Spring... ℘ ℔ 12c and upward
Machinery... ℘ ℔ 14c
Hammer... " 15c,
Gun or Homogeneous... " 16c

English Steel.—payable in gold, net.

" Best Cast... ℘ ℔ 17½c
" Extra Cast... " 18½c
" Round Machinery, Cast... ℘ ℔ 10½ @ 11½c
" Swaged, Cast... " 19½c
" Best Double Shear... " 17½c
" Blister, 1st quality... " 14½c
" " 2d quality... " 13 c
German Steel, Best... " 11½c
do 2d quality... " 10½c
3d quality... " 9½c
Sheet Cast Steel, 1st quality... " 17½c
" " 2d quality... " 14½c
" " 3d quality... " 12½c
File Steel, Flat and ½ Round... " 12½c
" Square and Round... " 12½c
" Mill... " 13½c
" Taper to 4 inch... " 16c
" Taper 3 and 3½ inch... " 18c

ANTIMONY... 14 @ 14½c. currency

LEAD—Duty: Pig $2 per 100 lbs.; old Lead, 1½ cent per lb.; Pipe and Sheet, 2¼ cents per lb.

Spanish... 6¾ @ 6⅞c gold
German Refined... 6⅞c gold
English... 6¾ @ 7c gold
American... 6½ @ 6⅞c currency
Bar... dis 10 %... 7½c.
Pipe... dis 10 %... 9c.
Tin Lined Pipe... dis 10 %... 16½c.
Sheet... dis 10 %... 9½c.
Shot... dis 10 %. Drop, 9½c. Buck, 10½c.

BABBITT METAL.

N. P. U... ℘ ℔ 8½ @ 9c
A., 25c.; B, 20c.; C, 15c.; D, 12c. ℘ ℔.

SOLDER... No. 1, 12 @ 12½c.; No. 2, 11½ @ 12c

SPELTER—Duty: In Pigs, Bars and Plates $1 50 per 100 lbs.

Silesian, cash... 6¾ @ 7c., gold
American "... 6¾ to 7c
Lehigh, on spot... 11c

TIN—Duty: Plates, Sheets, Tagger and Terne, 1·1c. per lb.; Electro-galvanized Plates, 2 cents per ℔; Manufactures of, not enumerated, 35 per cent. ad val. Bars, Block and Pigs, free. Banca, subject to duty of 10 per cent.

Banca... ℘ ℔ 21 @ 22c., currency
Straits... ℘ ℔ 18½ @ 19c., currency
English... ℘ ℔ 18 @ 19c., currency

TIN PLATES, CURRENCY PRICES.

I C 10x14, 12x12, 14x20 } Prime Charcoal... $7·50
I X 10x14, 12x12, 14x20 } Prime Charcoal... $9·75
D C 12½x17 "... 7·00
D X 12½x17 "... 9·75
For each additional X add... 2·25

COKE TIN PLATE.

	Best.	2d quality.	Ordinary.
I C 10x14, I C 12x12, I C 14x20	7·00	6·75	6·25 @ 6·50

TERNE PLATE.

	Prime Char.	2d qual.	Coke.
I C 14x20	$6 50	6·25	5·75 @ 6·00
I X 14x20	8·75		
I C 20x28	13·50 @ 14·00	13·00 @ 13·50	12·00 @ 13·00
I X 20x28	19·50		
I C 20x20	21·75		
I C 14x20 M F. Brand			$7·75 @ 8·00

ZINC.—Duty Pig or Block, $1 50 per 100 lbs. Sheet 2½c. ℘ ℔.

Sheet... cask 7¼ @ 7½
"... open 8c

Paper Stock, Old Metals, &c

(Dealers' Selling Price.)

Canvas linen... 5½ @
" cotton, No. 1... 6½
" " No. ... @ 3½
White linen rags, No. 1... 5½
" " No. 2... 3½ @ 4
Colored... 2½ @
Mixed woolens... 2½ @ 3¼
Soft woolens... 7 @
Gunny bagging... 2 @ 2½
Jute Butts... 2¼ @ 2¾
Kentucky bagging... 5 @
Waste paper and scraps... 1 @ 1¼
Rope cuttings... 1¾ @ 3
Kentucky Bale rope... 4 @ 4½
Oakum junk, No. 1... 5½ @ 5½
" No. 2... @ 4
Grass rope... 3¾ @
Tarred Shaking... 2
White Collar Cuttings, all paper... 7 @
" " " muslin lined... 5 @
" " Envelope... 7 @
Hard White Shavings, No. 1... 5¼ @
Soft " " No. 1... 4½ @ 4¾
White Shavings, No. 2... 4½ @ 4¾
Mixed Shavings, part white... 3½ @ 4
Imperfections, No. 2, best folded sheets... 4½ @
" 1, Heavy Stock... 4½ @
Book Stock, Mixed... 3½ @
" " No. 2, light... 2½ @
Newspaper Stock... 3
Prints... 1¾ @ 2
Pure Manilas... 2½ @ 2½
Bogus Manilas and Hardwares... 1 @ 1¼
Commons... 1 @
Binders' Board Cuttings... 1¼ @
Straw Board Cuttings... 1¼ @
Woolen Tailor Clips... 18 @ 14
Satinet Tailor Clips... 2 @ 2½

Old Metal.

Copper... 16½ @ 17
Yellow metal... 13 @
Brass light... 9½
Brass, heavy... 11
Heavy Composition... 14
Old lead, solid... & ... 5
Tea lead... 4½
Zinc... @ 4½
Pewter, No. 1... 15
" No. 2... 9 @ 10
Spelter... @ 6¼
Wrought Iron... per ton $20·00
Machinery Iron... per ton $18·00
Light Iron... per ton $12·00
Stove plate... per ton $10·00
Burnt Iron... per ton $5·00

Paints, Oils, &c.

Paints.

Black lamp—Coach Painters... ℘ ℔ 20c
" " Ordinary... 6c
" Ivory Drop, fair... 15c
" " best... 28c
Black Paint, in oil... kegs, 8c. ass't'd cans, 11c
Blue, Prussian, fair to best... 40 @ 50c
" " " in oil... 25 @ 55c
" Chinese dry... 83c
" Ultramarine... 18 @ 30c
Brown, Spanish... 1½c
" Van Dyke... 9c
Carmine, 40... combination price
Green, Chrome... 15 @ 25c
" " in oil... 18 @ 25c
" Paris... good, 31c; best, 40c
" " in oil... 35c 45c
Mineral Paints... 1¼ @ 4c
Orange Mineral... 14c
Red Lead, American... 8½c
" " English... 10½
" Venetian (N. C.) dry... 2c
" " in oil... ass't'd cans, 11c; kegs, 8½c
" Indian, dry... 10c
Rose Pink... 10 @ 18c
Sienna, American, Raw... 4c
" Burnt... 4½c
" " in oil... 16 @ 20c
" Raw "... 15 @ 25c
Umber, Burnt... 4 @ 8c
" " in oil... 16 @ 21c
" Raw... 3½ @ 7½c
" " in oil... 16 @ 22c
Vermillion, Chinese... 1 00, gold
" English... 72½c. gold
" Trieste... 1 10 "
" American, Common... 18c
White Lead, American, pure dry... 9½c
" " in oil... 10c
White, Paris, English, prime... in bbls. 2½ @ 2¾c
Yellow Ochre, French... 1 75
" " " in oil... ass't'd cans, 11c; kegs, 8c
" " Vermont... in casks 1½c
Yellow Chrome... 17 @ 27c
" " in oil... 18 @ 28c
Zinc White, American No. 1 dry... 9c
" " 1, in oil... 11c
" French (Paris)... 11c
" " in oil... 12c

Oils.

Linseed Raw... ℘ gal. casks 76c. bbl., 77c
" Boiled... " 81c. " 82c
Whale, Crude... "
" Bleached Winter... " 75c
Sperm, Crude... " 1·60
" Winter unbleached... " 1·66
" " Bleached... " 1·75
Seal, Extra Refined... "
Lard, Pure Winter... " 90c
" Spring... " 90c
Cotton Seed, Crude... " 63c
" Southern Yellow... " 67c
" White... "
Neatsfoot, Winter... 70c @ $1·10
Natura Lubricating... 38c @ 40c

Sundries.

Asphaltum... 6c
Benzine... ℘ gal. 16c
Chalk... ¾c
" Block...
Dryer, Patent, Am'n... ass't cans, 10½c.; keg 9c
" " English... " 11c.; " 9c
Flocks...
Frostings... 50c
Glue, White... 33 @ 44c
" Sheet... 25c
Glaziers' Points, Zinc... 90
Gum, Copal... 36c
" Damar... 25c
" Shellac, English... 45c
" " " dark... 40c
Litharge... 9½c
Pumice Stone, selected Lumps... 4 @ 6c
" powdered... 2⅜c
Putty in bladders... 2⅝c
" in bulk... 2½c
Rotten Stone, soft, English... 8c
Spirits Turpentine... 35c
Whiting, Spanish... ¾c

Glass

FRENCH WINDOW GLASS.

Prices current per box of 50 feet.

Single Thick.—Discount 60 %.

Sizes.	1st.	2d.	3d.	4th.
6 x 8 to 10 x 15	$ 7·50	$ 6·75	$ 6·25	5·75
11 x 14 to 16 x 24	8·50	7·75	7·25	6·50
18 x 22 to 20 x 30	10·75	9·75	8·75	7·75
15 x 36 to 24 x 30	12·25	10·75	9·00	
26 x 28 to 24 x 36	13·00	11·50	9·75	
26 x 36 to 26 x 44	14·50	13·25	10·75	
26 x 46 to 30 x 50	15·00	14·00	11·25	
30 x 52 to 30 x 54	16·00	14·50	12·00	
30 x 56 to 34 x 56	17·25	15·50	14·50	
34 x 58 to 34 x 60	18·25	17·25	15·00	
36 x 60 to 40 x 60	20·75	18·75	17·25	

Double Thick.—Discount 60&10 %.

Sizes.	1st.	2d.	3d.	4th
6 x 8 to 10 x 15	$12·00	$11·00	$10·00	$ 9·25
11 x 14 to 16 x 24	13·75	12·50	11·75	10·50
18 x 22 to 20 x 30	17·25	15·75	14·00	
15 x 36 to 24 x 30	19·75	17·25	14·50	
26 x 28 to 24 x 36	21·00	18·50	15·75	
26 x 36 to 26 x 44	23·25	21·25	17·25	
26 x 46 to 30 x 50	24·00	22·50	18·00	
30 x 52 to 30 x 54	25·75	23·25	19·25	
30 x 56 to 34 x 56	27·75	25·00	21·75	
34 x 58 to 34 x 60	29·25	27·75	24·00	
36 x 60 to 40 x 60	32·25	30·00	27·75	

Sizes above 40 x 60—$10·00 per box extra for every five inches.

An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 81 united inches, will be charged in the 84 united inches bracket.

Steel.

THE EDGAR THOMSON STEEL CO.,
LIMITED.
MANUFACTURERS OF

General Office and Works at Bessemer Station (Penn. R. R.), Allegheny County, Pa.

New York Office, 57 Broadway.

The members of the Edgar Thomson Steel Company, Limited, have had large experience in manufacturing and in railway management; their works are the most complete in the world, with all the late improvements, and are located in the best Bessemer metal district in the United States, and their managing officers are experienced in the manufacture of Bessemer Steel.
The Company warrants its rails equal in quality to any manufactured in the United States.
Rails of any weight or section furnished on short notice. Orders for trial lots solicited.

Branch Office and P. O. Address, No. 41 Fifth Ave., Pittsburgh, Pa.
D. McCANDLESS, Chairman. WM. P. SHINN, General Manager.

G. SANDERSON & CO.,
Manufacturers of all descriptions of
STEEL.
SHEFFIELD, ENGLAND.

Particular attention is paid to quality and temper for
Files, Saws, Table and Pocket Cutlery, Augers, Shovels, &c.
ALSO STEEL of superior quality for Turning Tools, Taps, Dies, Drills, &c.
Hot and Cold Rolled Sheets for Clock Springs, Corset Clasps, Pens, &c.
☞ *Makers of the Celebrated ROCK BORING DRILL STEEL.*
Warehouse, 102 John Street, New York.

JOHN NICHOLSON & SONS,
Sheffield, England.
Manufacturers of SUPERIOR
STEEL
Of all Descriptions.
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Sole Agent for the United States.
81 John Street, New York. 38 Kilby Street, Boston.

CHROME STEEL COMPANY,
MANUFACTURERS OF
CHROME CAST STEEL,
WARRANTED SUPERIOR TO ANY STEEL IN THE MARKET—EITHER ENGLISH OR AMERICAN—FOR EVERY PURPOSE.

Principal Office & Works, Kent Ave. and Keep St., Brooklyn, E. D. N. Y.
AGENCIES,
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Huntington, Hopkins & Co., San Francisco and Sacramento, Cal.
H. M. Buck & Co., St. Louis, Mo.
Potter & Hoffman, Philadelphia, Pa.
Geo. Dunbar & Co., Boston, Mass.
Wood & Leggat, Hamilton, Ont.
Cincinnati Branch, 123 Central Ave., George Kinsey, Manager.

ALBANY & RENSSELAER IRON & STEEL CO.,
Troy, N. Y.,
Office in New York City, 56 BROADWAY.
MANUFACTURERS OF
Bessemer Railway Steel,
MERCHANT BARS, TIRE AND SHAFTING,
Railroad Iron, Pig Iron, Merchant and Ship Iron,
AGENCIES IN BOSTON AND PHILADELPHIA.

JOHN WILSON'S CELEBRATED
BUTCHERS' KNIVES,
BUTCHERS' STEELS,
AND
SHOE KNIVES.

THE TRADE MARK, IN ADDITION TO THE NAME, IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY
JOHN WILSON.

GRANTED A.D. 1766, BY THE CORPORATION OF CUTLERS OF SHEFFIELD, AND PROTECTED BY ACT OF PARLIAMENT.

BUYERS ARE SPECIALLY CAUTIONED AGAINST IMITATIONS OF THE MARK, AND THE SUBSTITUTION OF COUNTERFEITS BEARING THE NAME, "WILSON," ONLY.

Works:—SYCAMORE STREET, SHEFFIELD. ESTABLISHED in the Year 1750

HERMANN BOKER & CO.,
OFFICES AND WAREHOUSES:
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REMSCHEID and SOLINGEN (Prussia.) H. BOKER & Co.
SHEFFIELD (England), No. 3 Arundal Lane, Represented by Mr. ARTHUR LEE.
LIEGE (Belgium), Represented by Mr. LOUIS MULLER.
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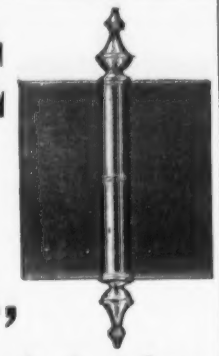
Proprietors of TRENTON VISE AND TOOL WORKS, Trenton, N. J.—Vises, Picks, Mattocks, Grub Hoes, Sledges, Hammers, Bridge Work, Turn Tables, etc.
Proprietors of the MANHATTAN CUTLERY CO., "O. K." Razors.
LAMSON & GOODNOW MFG. CO., Shelburne Falls, Mass.—Table Cutlery and Butcher Knives.
W. & S. Butcher's Files, Edge Tools and Razors, the largest stock in the United States.
Geo. Wostenholm & Son's Knives, Scissors and Razors, the largest stock in the U S.
John Wilson's Butcher and Shoe Knives.
Peter Wright's and Armitage Anvils.
We always have on hand a full assortment of
German and English Hardware, Cutlery, Guns, Gun Material, Chains, Heavy Goods,

Business Established in 1830.

BLAKE BROS.
Hardware Co.,
MANUFACTURERS OF



Plain and Ornamental Butts, Thumb Latches,
STORE DOOR HANDLES,
Single or Double Handle, Reversible Mortise Latch,
Patented January 9, 1877.
Oilable Axle Pulleys,
Patented October 10, 1876.
KEY ESCUTCHEONS that keep the Key in the Lock,
Patented February 2, 1875.

CORK EXTRACTORS, NUT CRACKERS,
And a large line of
BUILDERS' HARDWARE.

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S. T. Latham & Co., 417 Commerce Street, Philadelphia, Pa.
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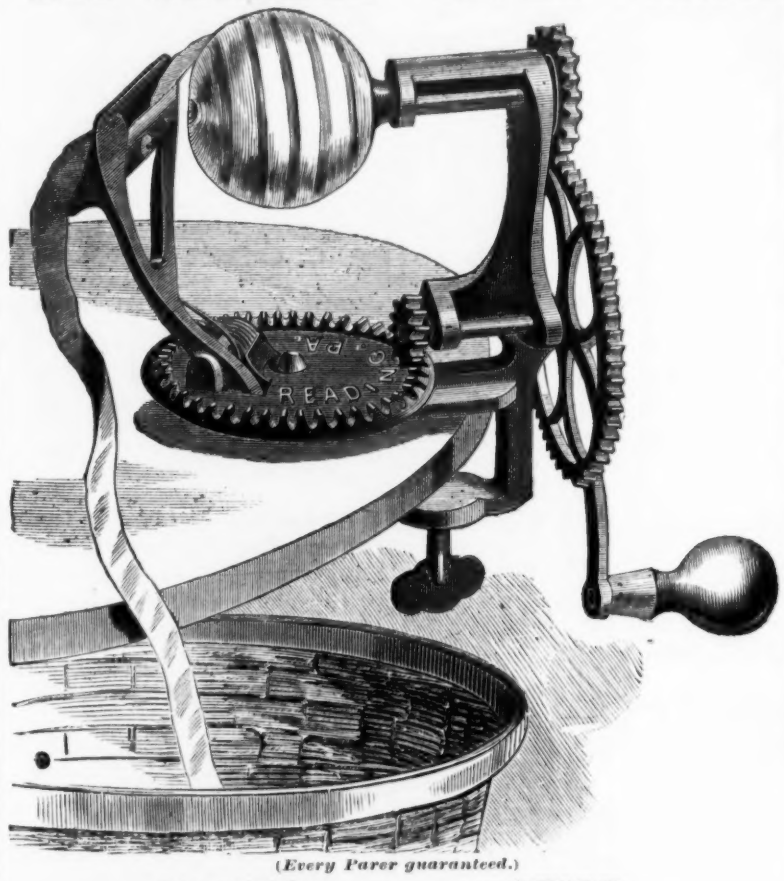
READING BUTT WORKS.
RICK BROTHERS.
"OLD RELIABLE" APPLE PARER.



(Every Parer guaranteed.)
Price, per single dozen ..... $5'00.
Packed one dozen in a box.
New York Warerooms, 103 Chambers Street. E. E. YATES & CO., Agents.

NORTHWESTERN
HORSE NAIL CO.
ESTABLISHED IN 1862.
HAMMERED AND FINISHED HORSE NAILS.
We offer our Finished Nail to the trade with the confidence that it has no equal in the market. It is the genuine "Northwestern" Nail, Finished, and we give it our unqualified guaranty.
Office and Factory, 56 to 68 Van Buren st., Chicago.
A. W. KINGSLAND, Secretary.

GLOBE NAIL COMPANY,
MANUFACTURERS OF
Pointed Polished & Finished Horse Shoe Nails.
Recommended by over 20,000 Horse Shoers.
All nails made from best NORWAY IRON, and warranted perfect and ready for driving. Orders filled promptly and at lowest rates by
GLOBE NAIL CO., Boston, Mass.

THE FOWLER NAIL CO.,
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THE VULCAN HORSE SHOE NAIL
POINTED READY FOR DRIVING.

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GRINDSTONES.
SOLE AGENT OF THE
BEREA STONE CO., of Ohio.
NOVA SCOTIA and other brands.
283 & 285 Front Street, New York.

WORTHINGTON & SONS,
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Manufacturers of
Lake Huron Amherst, and Berea
GRINDSTONES.

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STONES.

LETOILE,
UNION,
PREMIUM,
DIAMOND GRIT,
WHITE MOUNTAIN,
INDIAN POND (red ends)
Stones gotten up or labeled in any style desired. Price and quality guaranteed.
Our Stone are of good keen grit and *will not glaze.*

Steam Oil Stone Works.
F. E. DISHMAN,
Successor to WM. GALBRAITH & Co.
Manufacturer of and Dealer in the Best
Washita, Arkansas, Hindostan and Sand
STONES,
☞ Of various sizes and patterns, suited to every variety of Mechanical use. ☜ New Albany, Ind.
Send for price list.

BOYD & CHASE,
The largest manufacturers in the world of
OIL  STONE

Of all description.
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Send for Price List. NEW YORK.

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The following superior and well known Lehigh Coals are mined by ourselves and firms connected with us, viz.
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Pardee, Sons & Co. Mt. PLEASANT.

ROBERT HARE POWEL & CO.
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75 Trinity Building, New York.
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SEMI-BITUMINOUS
COALS.
THE BEST & CHEAPEST
In the market for the use of Ocean Steamers, Tugs, Steamboats and Locomotives, Stationary Engines, Steel Makers, Rolling Mills, Puddling Furnaces, Glass Manufacturers, Blacksmithing, Brick and Lime Burning, and General Industrial Purposes.
These coals can be delivered to all points reached by railroad or navigation.

Lehigh Valley Coal Co.,
MINERS AND SHIPPERS OF
Lehigh, Wyoming White & Red Ash
(BALTIMORE VEIN.)
Office, cor. Cortlandt & Church Sts.
Coal and Iron Exchange Building.
GEORGE B. NEWTON, Agent. Shipments by Railroad and Morris Canal direct from the mines, and from Perth Amboy and Jersey City, for all Points.

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Dealers in
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Retail Yard on D. L. & W. Railroad, cor. Grove and 19th Sts., Jersey City. Coal delivered direct from Shutes to Carts and Wagons. Families and manufactories supplied with the best qualities of Coal at the lowest rates.
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WHEELING HINGE CO.,

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Manufacturers of

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GRAHAM & HAINES, Sole Agents, 113 Chambers & 95 Reade Sts., N. Y.

QUACKENBUSH, TOWNSEND & CO.,

Hardware, Cutlery, &c.

85 Chambers & 67 Reade Sts., N. Y.

Depot for THOS. JOWITT & SONS, (Sheffield, England,) FILES and HORSE RASPS.

Rough & Ready And CLIPPER SCYTHES, Warranted.

Manufacturers of the

CHALLENGE DOOR & GATE SPRING.

Patented March 4, 1873.

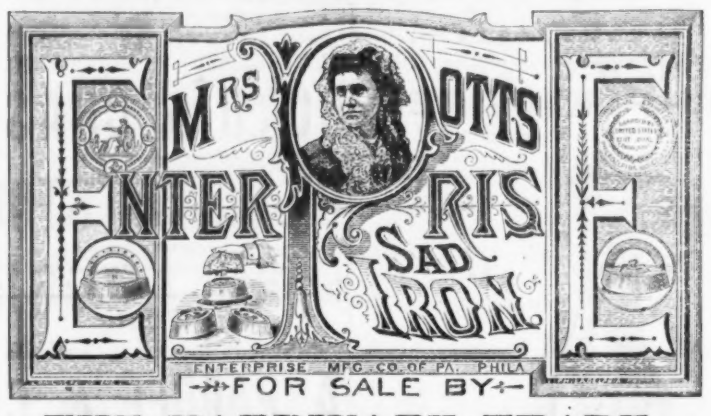
Agents for Norwich Lock MFG. CO.

"BEAVER" American) FILES and HORSE RASPS.

"WIDE AWAKE" AXES.

ENTERPRISE MFG. CO. of PA.

Patented Hardware Manufacturers.



THE HARDWARE TRADE.

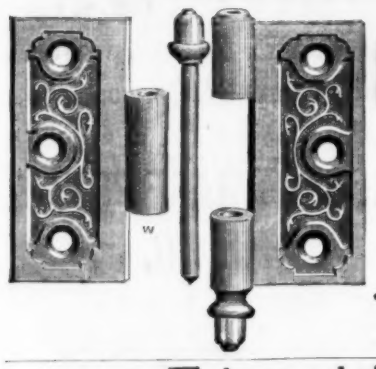
MRS. POTTS' COLD HANDLE IRONS,
COFFEE, SPICE AND DRUG MILLS,
CORK PRESSERS, SAUSAGE STUFFERS,
FRUIT LARD & JELLY PRESSES combined,
MEASURING FAUCETS, TOBACCO CUTTERS,
SELF-WEIGHING CHEESE KNIVES,
BUNG HOLE BORERS, &c., &c, &c.

S. W. Corner American and Dauphin Sts.,

PHILADELPHIA.

CLARK & CO.,

MANUFACTURERS OF



BUILDERS' HARDWARE.

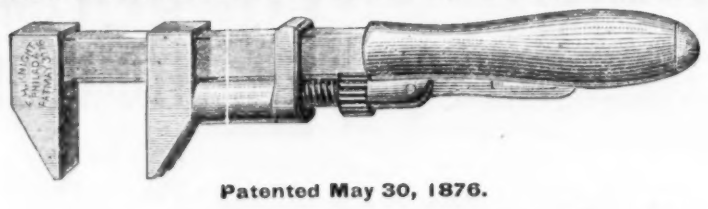
426 & 428 Niagara Street,
BUFFALO, N. Y.

J. CLARK WILSON & CO., Agents,
81 Beekman St., New York.

Send for Catalogue and Price List.

Edward H. Knight's

Pat. Ratchet Screw Wrenches



Patented May 30, 1876.

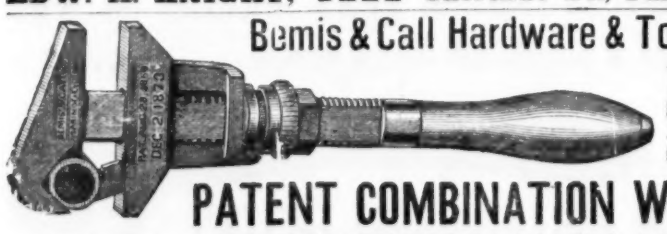
Best and Strongest in the Market.

"STEEL BAR." SAVES HALF THE TIME.

First Premium awarded at the Centennial Exhibition.

EDW. H. KNIGHT, 1222 Chestnut St., Philadelphia.

Bemis & Call Hardware & Tool Co.



This Wrench can be furnished with Briggs' Pat. Nut or Sleeve.

PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, Case-Hardened throughout, and not only combine all of the superior qualities of our cylinder or Gas Pipe Wrenches, but also all requisite Combinations of a regular Nut Wrench, thus making a Combination which has no equal.

For Circulars and Price List, address,

BEMIS & CALL HARDWARE & TOOL CO. Springfield, Mass.

METALLIC SIEVES.

Protected by 14 patents.

MANN'S PATENT.

Best Sieve known, Cheap, Neat and Durable.

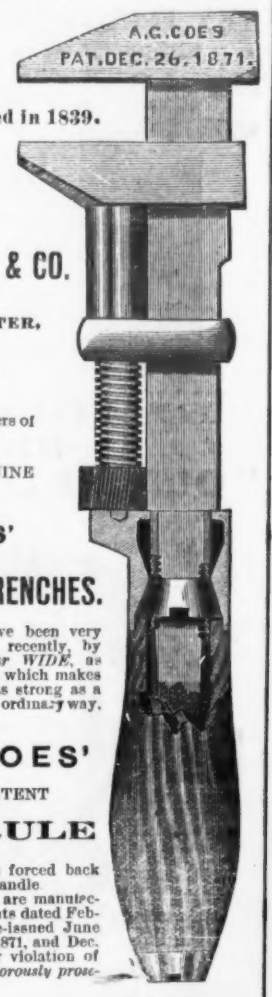
ADAMS & WESTLAKE MFG. CO.,

CHICAGO, ILLS.

GRANT & CO., Newark, N. J

Cap Rifles & Targets.

Established in 1839.



A. G. COES & CO.

WORCESTER, Mass.,

Manufacturers of

THE GENUINE

COES'

SCREW WRENCHES.

Our goods have been very much improved recently, by making the *Bar WIDE*, as shown in the cut, which makes a 12 in. Wrench as strong as a 15 in. made in the ordinary way, and by using

A. G. COES'

NEW PATENT

FERRULE

Which cannot be forced back into the handle.

☞ Our goods are manufactured under Patents dated February 7, 1860, (re-issued June 29, 1871), May 2, 1871, and Dec. 26, 1871, and any violation of either will be *vigorously prosecuted.*

We call particular attention to our new Patent Ferrule, with its Supporting Nut (shown in section in the above cut), which makes the strongest Ferrule fastening known.

A. G. COES & CO.

Hoffman's Patent

SHUTTER BOWER,

FOR

Outside and Solid Window Shutters.

This is the best and most reliable article ever offered for this purpose.

For sale by

The Reading Hardware Co.,

AND

CHAS. M. GHRISKEY,

Sole Agent for Patentee,

508 Commerce Street, Philadelphia, Pa.

"I Rise to remark."

GOLD MEDAL.

A PERFECT MANGLE FOUND AT LAST.

Baldwin's Steam Mangle,

Hotels, Asylums, Laundries.

Families See Circulars.

Standard Laundry Machine Co., Boston & New York.

COBB & DREW,

Plymouth, Mass.

Manufacturers of Copper, Brass, and Iron Rivets: Common and Swedes Iron, Leathered, Carpet, Lace and Glass Tacks; Finishing, Hungarian, Trunk Clout and Cigar Box Nails, &c. Rivets made to Order.

NEW YORK AGENCY

Grundy & Kenworthy

HARDWARE.

165 Greenwich Street.

Agent for the Philadelphia Star Carriage and Tire Bolts.

Lloyd, Supplee & Walton,

HARDWARE FACTORS.

MANUFACTURERS OF

Bonney's Hollow AUGERS.

Stearn's Hollow Augers and Saw Vises

Bonney's Spoke Trimmers

Double Edge Spoke Shaves

Adjustable Gate Hinges

Scandinavian Pad Locks

Flat Key Brass and Iron Pad Locks, &c., &c.

625 Market St., Phila., Pa.

"FELTER'S PATENT LOCKS,"

MANUFACTURED BY

The American Lock Mfg. Co.,

Are the most SECURE and DURABLE ever made.

SECURE

Because they have 40 Brass Tumblers, independent in their action, either one of which will prevent the Lock from being opened unless brought to proper position by the Key.

DURABLE

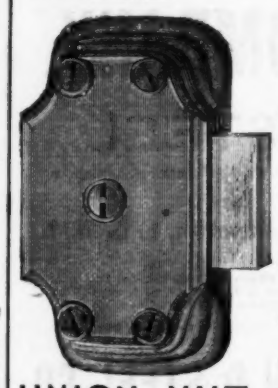
Because we use no Springs to break or get out of place

THEY HAVE

STERLING METAL KEYS

That will not corrode or wear, and are stronger than steel.

FULL SIZE OF KEY.



Upright Rim Dead Locks,
Horizontal Rim Night Latches,
Horizontal Rim Tubular Night Latches,
Mortise Night Latches, Plain Fronts,
Mortise Night Latches, Ornamental Bronze Fronts and Knobs,
Brass Chest, Box, Cupboard and Drawer Locks,

Solid Bronze Padlocks.

Illustrated Catalogue and Price List sent on application.

All orders should be addressed to

UNION NUT CO., General Agents, 99 Chambers St., N. Y.

THE IMPROVED

HOWE SCALES

In Competition with the World, at Philadelphia, 1876.

TWO FIRST MEDALS, and TWO DIPLOMAS OF MERIT

The following are the points that the Judges officially announce as the basis of their award of the highest honors to the Howe Scales:

1st. For their Protected Bearings (the Howe is the only Scale with protected bearings), which makes the Scale *DURABLY ACCURATE.*
2d. For their Strength.
3d. For their Simplicity.
4th. For their economy in construction.
5th. For their first-rate material and workmanship.
6th. For their various original improvements and adaptations (which being patented are exclusively possessed by the *HOWE*).

The Improved Howe Scales

MADE BY THE

BRANDON MFG. COMPANY, of Brandon, Vt.,

Are Guaranteed Superior to all others.

For Plans, Prices and other information, address,

A. M. GILBERT & CO., 95 to 101 Lake St., Chicago. 116 Main St., Cincinnati. 612 N. Third St., St. Louis.
PAGE & CO., - 3 Park Place, New York City. 63 Wood St., Pittsburgh.
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FROTHINGHAM & WORKMAN, - - - - Montreal, Canada.

V. G. HUNDLEY.

79 Reade Street, New York.

North Carolina Handle Co.,

Manufacturers of

SPOKES, AXE, PICK, SLEDGE, HAMMER, HATCHET and other HANDLES.

Ful. assortment always on hand.

PHILADELPHIA.

(Corrected weekly by Lloyd, Supplee & Walton).

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Anvils.
Peter Wright's, ℔ ℔, gold....11 @ 10½c
Wilkinson's " ....11 c
Eagle....9 cents per lb—dis 20%

Apple Parers.—Domestic....per doz $ 6·50
Peach Parers.... " 10 50
Bay State Parer, Corer and Slicer.... " 12 50
Other makes.... " 7 50
Lots of 5 to 25 dozen special price.

Axes.—
Mann's (according to weight)..Per doz. $10 00 @ 9 00
Red Indian. " ... 10 50 @ 9 50
Red Chieftain " ... 11 00 @ 10 00
Hunt's " ... 12 50 @ 11 50

Augers and Auger Bits.—
Benjamin Pierce....dis 35 @ 40%
Douglass' & Ives' Bits....dis 45%
Connecticut Valley Auger Bits....dis 50%
Cook's Bits....dis 50 @ 50&5%
Jennings' Bits....dis 10%
Bates' Nut Augers....dis 40 @ 40&10%
Douglass' & Ives' Augers....dis 45%
Watrous' Ship Augers....dis 20%
Bonney's Pat. Hollow Augers....dis 25&10%
Stearns' Patent Hollow Augers....dis 25&10%

Balances.—
Light or "Common"....dis 25&10%
All other Spring Balances....dis 25%

Bells.—Bevin Bros. Mfg Co. Light Hand Bells...dis 70%
Hand, Common....70&10 @ 75%
Swiss Pattern Hand Bells....dis 50%
Connell's Door Bells....dis 50&10%
Gt. Western & Kentucky Cow, new list....dis 40%

Boring Machines.—Bates Mfg. Co., complete with augers....dis 25 @ 25&10%
Douglas Mfg. Co., complete with augers....dis 40%
Common Boring Machines, no Augers....$8 15 net
Angular " " ....4 00 net

Bolts.—Eastern Carriage Bolts....dis 75 @ 75&5%
Western " " ....dis 75%
Philadelphia " " ....dis 60&10 @ 60&20%
Coleman " " ....dis 60&10 @ 60&20%
Wrought Shutter, Stanley....dis 50 @ 50&10%

Braces.—Barber's....dis 40&5%
Backus....dis 50 @ 50&10%
Bartholomew's American Ball....dis 20&10%
Spofford....dis 50%

Butts.—Cast Fast Joint, Narrow....dis 30, 12½&10%
" " Broad....dis 40, 12½&10%
Cast Loose Joint....dis 50, 12½&10%
" Acorn, Loose Pin....dis 45, 12½&10%
" Acorn " Jap'd....dis 55, 12½&10%
" Mayers and Parliament....dis 40, 12½&10%
Lull & Porter's (Phila.) Hinges....dis 65 @ 65&10%
Wrought Loose Pin....dis 40&5%
" Table Hinges and Back Flaps....dis 35&5%
" Narrow....dis 40&5%
" Loose Joint....dis 40&5%

Blind Butts.
Parker....dis 70 @ 70&10%
Buffalo Hardware Co....dis 60 @ 60&10%
Clark....dis 60 @ 60&10%
Shepard....dis 60 @ 60&10%
Garretson....dis 60 @ 60&10%

Chains.—German Halter and Coil....dis 25% gold
Galvanized Pump....net 10½c
Best Proof Coil Chain—
℔ ℔.... 12 9 8½ 8 7½ 7¼ 7c gold
3-16 ¼ 5-16 ⅜ 7-16 ½ ⅝ in.
By the cask, 500 lbs., ½c per lb. less Common Chain, ½c per lb. less.

Chisels.—Socket Framing....dis 60, 10&10%
Socket Firmer....dis 60 @ 60&10%
Tang " ....dis 40%
Beaty's Framing and Firmer....dis 20%

Casters.—Iron Bed....dis 40&10 @ 50%
Porcelain Wheel Bed....dis 40&10 @ 50%
Iron and Brass Wheel Plate....dis 50 @ 50&10%
Porcelain Wheel " ....dis 50 @ 50&10%

Coffee Mills.—Common Box and Side....dis 25%
Patent Box and Side....dis 25%

Cutlery.—American Pocket (best)....dis 30 @ 33⅓%
Landers, Frary & Clark, J. Russell & Co. and Lamson & Goodnow Mfg. Co. Manufacturers' net prices

Drawing Knives.—
Hart Mfg. Co.'s....dis 60&10 @ 60, 10&10%
Adjustable Handle....dis 10 @ 15%
Beatty....dis 15 @ 20%

Fry Pans.
Tinned....dis 50 @ 50&10%
℔ doz..$3·50 4·00 4·50 5·00 5·50 6·50 7·50 9·00 10·00
No.... 0 1 2 3 4 5 6 7 8
Burnished....dis 50 @ 50&10%
℔ doz..$3·00 3·75 4·25 4·75 5·25 6·00 7·00 8·00 9·00
No.... 0 1 2 3 4 5 6 7 8

Files.
Nicholson Mill Files....new list, dis 25 @ 30%
" Bastard.... " dis 25 @ 30%
" Taper.... " dis 25 @ 30%
Butcher's Mill....℔ £ gold $4 75 @ $4 50
" Bastard....℔ £ gold 4 75 @ 4 50
" Taper....℔ £ gold 4 75 @ 4 50

Fluting Machines.
Mrs Knox—4 in. rolls....each, $3 25 dis 10%
" —6 in. rolls.... " 3 80 dis 10%
" —8 in. roll.... " 5 60 dis 10%
Imperial—4½ in. roll....each $3 25 net @ dis 10%
" —6 in. roll.... " 3 75 net @ dis 10%
Crown—4½ in. roll....each $ 3 25 net
" —6 in. roll....3 50 net

Hammers.
Yerkes & Plumb's....new list dis 25%
Hammond & Son's....dis 25%
Veree....dis 20 @ 25%

Hatchets.
Beatty's....dis 25%
Shingling and Half. { ℔ doz...$7·00 7·50 7·75 8·00 / No.... 1 2 3 }
Yerkes & Plumb....dis 25%
Shingling and Half. { ℔ doz...$7·00 7·50 8·00 8·50 / No.... 1 2 3 4 }
Claw.... { ℔ doz....$7·50 8·00 / No.... 1 2 3 }

Hinges.
Strap and T....dis 60&5%

Horse Nails.

	Nos. 5	6	7	8	9	10
Putnam	32	28	26	25	24	23
Ausable Pointed & Polished, list	28	26	25	24	23	
Clinton Horse Nails	20	18	17	16	15	
" Polished and Pointed	21	19	18	17	16	
Globe	28	26	25	24	23	

Discount on Ausable, Globe and Putnam....dis 10%

Knobs.—
Rim and Mortise....dis 35 @ 35&2%

Locks and Latches.
Door Locks, Rim and Mortise....dis 35 @ 35&2%
Till and Cupboard Locks....dis 25&5 @ 25, 5&2%
American Padlocks....dis 33⅓ @ 33⅓&5%
Scandinavian Pad Locks.
℔ doz.....$10·50 10·50 12·00 12·00 15·00 15·00 } 50&10 @
No....... 59 59½ 60 60½ 61 61½ } 50&15%
℔ doz.....$18·00 18·00 22·00 22·00 } 10%
No....... 62 62½ 63 63½
United States Lock Co....dis 35%
Trunk Locks....dis 25%

Lanterns.—Square Candle and Oil....dis 10%
Globe for Oil....dis 10%
" " Kerosene....dis 10%
Tubular Lanterns....dis 10%

Mattocks.—Long and Short Cutter....dis 25%
Western Pattern....dis 25%
Pennsylvania Pattern....dis 15%

Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets....dis 20%
Stebbins' Gates....dis 62½&10%
Lincoln's "....dis 60&10%
Landers, Frary & Clark's Petroleum....dis 15&10%
Taylor's Petroleum Faucets....dis 20&10%
Brass Liquor Cocks....dis 45 @ 50%

Meat Cutters.—Dixon's....dis 25%
Woodruff....dis 25%
Stowe....dis 25%
Hale's....dis 35%
Stuffers....dis 25%

Planes.—Auburn Tool Co.."Bench....dis 40%
Second Quality....dis 50%
Bailey Iron Planes....dis 25&10%
Evans Pat. Circular....net

Plane Irons.—American....dis 10%
Butcher's....gold £, $5 00

Plumbs and Levels.
Adjustable....dis 60&10%
Non-Adjustable....dis 60&10%

Picks.—Philadelphia....net
Pittsburgh....net

Rules—Boxwood....dis 55&10%
Ivory....dis 45&10%

Rakes.—Cast Steel Garden....dis 40 @ 40&10%
Malleable Garden....dis 40 @ 40&10%
Wood Head Iron Teeth....dis 40 @ 40&10%

Steelyards.—American Pattern....dis 20 @ 25%
℔ doz.....$5·50 7·00 9·00 10·00 1... 12·00
No....... 50 100 150 200 25.. 300
English Pattern....dis 15 @ 20%
℔ doz.....$7·00 8·67 10·67 12·67 14·67 16·67
No....... 50 100 150 200 250 300
Hart's Pattern....dis 55 @ 55&10%
℔ doz.....$14·50 17·75 21·00 26·50 31·00 35·50
No....... 50 100 150 200 250 300

Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened....℔ doz. $9·50
Clipper No. 10, Bronzed Blade Boxed and Sharpened....℔ doz. $9·00
Clipper No. 5, Painted Red, Boxed and Sharpened....℔ doz $8·50
Cast Steel Scythes....$7·50 @ 8·00
German "....6·50 @ 7·00

Squares.—Steel and Iron, new list....dis 50%

Saws.—Disston's Cross Cut, No. 1....per ft., 55c
Disston's Cross Cut No. 2....per ft., 50c
Disston's Cross Cut, Patent....per ft., 50c
Disston's Circular Saws....dis 25 @ 30%
Disston's Hand Panel and Rip, &c....dis 20%
W. McNiece's H'd, Cross-Cut & Circ'r, new list, dis 15%
Boynton's Lightning Cross-Cut....dis 50 @ 50&10%
Boynton One-Man Cross Cut Saws....dis 40&10%

Shovels and Spades.
Rowland's Plain Back....dis 47½&2½%
" Back Strap....dis 47½&2½%
Extra discount on above for 10 days' cash, 5%.
Oliver Ames & Sons, new list....dis 30%

Sad Irons.—Richmond (polished face)....per lb. 3½c
Richmond (polished face).... by the cask " 3

Stone.—Arkansas Oil, No. 1....℔ ℔ $
Turkey Oil. No. 1.... " 25c
Washita Extra....net " 35c
" No. 1....net " 30c
" " 2....net " 25c
Hindostan 8 inch....℔ ℔ 4¼ @ 4½c., net

Screws.
United States and others in Combination....dis 60%

Spoons.—
Plated....dis 40 @ 40&5%
Britannia, Boardmans (new list)....dis 50&10%
" Parkers (old list)....dis 50 @ 50&10%
German Silver....dis 25&5%
Lalance & Grosjean Iron....dis 10&5%
" " " by case....dis 20&5%

Springs.—Gray's Door....$2 15 @ $2 25
Torry's Door....2 15 @ 2 25
Gem....dis 10%

Stocks and Dies.....dis 10&5%

Stove Polish.—Gem....℔ gross, $4·25 @ 4·50
Onyx.... " $4·00 @ 4·25
Dixon.... " $5·75 @ 6·00

Try Squares.—Winterbottom....dis 20 @ 20&10%
Stanley Rule and Level Co....dis 45&10%
Willis Thrall, No. 2....dis 30&10%
Disston's No. 2....dis 45%

Tacks, &c.—Half Weight Tacks....dis 75 @ 75&10%
Trunk, Clout and Finishing Nails....net to 10%

Traps.
Genuine Oneida—Newhouse....list dis 25 @ 25&2%
Im. Oneida—Newhouse list (1st qual.)....dis 40&45%

Vises.—Solid Box, Trenton....℔ ℔ 12½c

Wrenches.—Coes Genuine....dis 50%
Coes Pattern Wrought Bar....dis 50&10%
" " Malleable Bar....dis 70&10 @ 75%
Girard Wrenches, Coe's Pattern....dis 50&10%
" Agricultural Wrench.... } $3·60 $5·40 net
Wrought Bar, Coe's Pattern.... } 10 12 in
Tafts Pattern (Wrought Bar)....dis 70 @ 70&10%
Philadelphia Tool Co.'s Pat. Duplex....dis 25%
" " " Improved Baxter....dis 25%

Wire.—
No. 0 to 18....dis 52½ @ 55%
No. 19 to 26....dis 57½ @ 60%
No. 27 to 36....dis 60 @ 62½%
Coppered 0 to 18....dis 47½ @ 50%
Tinned Broom Wire....dis 35%
Galvanized Wire No. 1 to 18....dis 25%

Wringers.—Novelty No. 10....$63·00
Novelty No. 2....66·00
Universal....66·00

BUFFALO.

Reported by Messrs. Sidney Shepard & Co.

March 1, 1877.

Bells, Cow—Yaw's Genuine....dis 35%
Braces—Bit, Spofford's Patent....dis 70%
Brads, Cut....dis 50&10%
Brass—Sheets....list net
Boards—Stove, Brooks' Pat.dis 35% 4 mos.; 35&5% 30 dys
Bolts—Stove....dis 45%
Brick—Bath (box of 2 doz) Best English....$1·13
Can Openers—Sprague's....dis 55&10%
Cases—Parlor Coal Hod....dis 15%
Chisels—Firmer Socket....dis 60, 10&10%
Framing Socket....dis 60, 10&10%
Corner Socket Chisels....dis 60, 10&10%
Slick's Carpenters'....dis 60, 10&10%
Castings—Malleable....℔ ℔ 7½c
Cocks—Globe and Bibb....dis 45%
Cutters—Meat, "Hales"....40%
Egg Beaters—"Dover"....per doz $4·00
Elbows—Corrugated....dis 15%
Adjustable....dis 20%
Columbus....dis 25%
Files—Maischoss Bros....dis 50&10%
Fluters—Geneva Hand....℔ doz. $15·00
Freezers, Ice Cream—"Champion"....dis 33⅓&5%
Hinges, Gate—Shepard's....dis 40&5%
Hinges—Window Blind—
Shepard's and Standard....dis 60&10%
Hods, Coal—Plain, Black and Galvan'd...new list dis 15%
Funnel, Black and Galvanized.... " dis 15%
Fancy and Helmet.... " dis 15%
Sad Irons....3c
Kettles—Brass....℔ ℔. 45c
Copper, "Hand Made"....38c.
Enameled....dis 50%
Knives, Drawing—Oval No. 1....dis 60, 10&10%
Razor Blade....dis 60&10%
Lanterns, Tubular—with guard....$11·50 } dis 15%
Without guard....11·00 }
Machines—Apple Paring....7·50 ℔ doz
Mills, Coffee—Box and Side, common....dis 25%
Box Union and Eagle....dis 20%
Cut Nails, "Caesapeake," 10d....$2·85
Horse, Ausable....No. 5 7 8 9 10
30 27 25 24 23 22c
" " Pointed & Polished....add 1c ℔ ℔
" " 1000 lbs....dis 5%
Paint—White Lead, U. S. Gov't....℔ ℔ 8½c
Pans—Dripping....℔ ℔ 9c
Frying....dis 50%
Rivets—Iron, Black and Tinned....dis 55 @ 60%
Screws—"American Screw Co"—
Flat Head, Iron....dis 60%
Flat Head, Brass....dis 55%
Sieves—Wood, Hoop Iron....$1·25
Tinned....1·50
Sifters—Ash....$9·00 @ $12·00
Skates and Straps—White's....dis 30%
Spoons, Iron Tinned....dis 10%
" by the case....dis 20%
S. S. & Co., Kitchen....dis 20%
Plated Rogers' A No. 1....dis 40%
Britannia....dis 55%
G. S. Hall, Elton & Co....dis 25%
Scales—Buffalo Scale Works....dis 25%
Fairbanks....dis 15%
Stove Polish—Gem....℔ gross, $4·50
" Dixon's....6·00
Palace....℔ gross, $3·00; bulk, per ℔.. 9c
Squeezers—Lemon, Porcelain....℔ doz., $5·40
Tacks—Half Weight Am. Iron....dis 75&10%
Tea Trays....dis. 15%
Thermometers—Tin Case....dis 50, 10&10%
Tools—Tinmens'....dis 10%
Vases—Palace Coal....dis 15%
Vises—
Parallel, Buffalo....dis 30%
Wire—Brass and Copper....list net
Wire—Bessemer Steel....dis 15%
Wringers—Novelty....$66·00

Tin Plates.—Add for each X....2·50

10x14, IC, Charcoal...	$8·00	14x20 C, terne....		$7·00
12x12, " ...	8·00	20x28 C, "		15·00
12½x17, " ...	7·50	20x28 X, "		20·00
14x20, " ...	8·00			

Pig Tin—Straits....20½c @ 21c
Bar Tin....21½c

Solder—No. 1, Crook's....15c
No. 1 Star....13c

Sheet Zinc—
"Lasalle"....570 100 ℔ casks
$8 50 8·30 ℔ 100 ℔s
Sheets....$8·50

Babbitt Metal....℔ ℔ 12c

Iron Wire—Bright and Annealed....dis 52½%
Coppered....dis 47½%
Tinned....dis 35%
Tinned Broom, { Nos. 20 21 22 / 20c 21c 21c } ....dis 40%

Copper—Sheathing 14 @ 18 oz....℔ ℔ 31c
Planished....℔ ℔ 37c
" Boiler Sizes....℔ ℔ 39c
Bottoms....℔ ℔ 32c
Bolts....℔ ℔ 32 @ 34c
Braziers' Sheets....℔ ℔ 32 @ 34c

Sheet Iron.
18 Common....$3 40
24 Common....3 60
26 Common....3 80
24 W. D. Wood & Co., Smooth Finish....4 50
Planished....A. B.
12c 10c
Gen. Russia, No. 1 stained....12½c
" " clean....13½c
Galvanized....dis 33⅓%

Tin Ware.
Deep Stamped Plain and Retinned....33⅓%
Com. " " ....dis 20%
Japanned " " ....dis 20%

CHICAGO.

(The Chicago Stamping Co., 72, 74 & 76 Lake St.)

March 1, 1877.

Tin Plate.—

10x14, IC, Ch'l. Good.$		14x20, IXX, Ch' Best.	12 75
10x14, IC, " Best.	7·75	14x20, IXXX, " "	15 25
10x14, IX, " "	10 25	DC, 100 Plate " "	7 75
12x12, IC, " "	7 75	DX, " "	10 25
12x12, IX, " "	10 25	DXX, " "	12 75
14x20, IC, " "	7 75	DXXX, " "	15 25
14x20, IX, " "	10 25	IC, Roofing, " "	7 25
		IX, " " "	9 75

20x28, IC, Charcoal Roofing, Good....14 50
20x28, IC, " Best....15 00
20x28, IX, " " 19 50
10x14, IC, Coke Plates....7 00
14x20, IC, " 7 25
10x20, IC, " 11 25

Block Tin.—
Large Pigs....24c | Bars....26c
Small....25c |

Zinc.—Sheet, 500 to 1000 ℔. Casks....8 c
Loose Sheets....8½c
Slab Zinc or Spelter....7 c

Copper.—Bottoms....34c
Sheathing....32c
Planished....38c
" Boiler lengths....40c
Bolt....35c

Braziers' Sheets.—
30x60, 6 to 7 lbs....℔ ℔ 38c | 30x60, 10 to 12 lbs...℔ ℔ 34c
30x60, 8 to 9 lbs.... " 36c | 30x60, 15 to 100 lbs. " 32c

Solder.—F. S. & Co.'s make
Best Fine....18c
No. 1....17c
Roofing....15c
Braziers or Spelter Solder....35c

Antimony....20c

Babbit Metal—F. S. & Co.'s....16c
No. 2....14c

Sheet Iron.—

	Common.	Smooth. Com.	Smooth Charcoal.	Smooth Juniata
No. 24........	3½c	4½c	6¼c	8½c
25 & 26...	3⅝c	4⅝c	6½c	8½c
27........	4 c	5 c	6⅝c	8⅝c

Galvanized Iron.—
No. 16 to 20....12c | No. 27....15c
21 to 24....13c | 28....16c
25 & 26....14c |

Russia Iron.—
Perfect....14c | No. 1 Stained....13c
| In Sheets, 1c. higher.

American Russia.—
A....12c | B....10c
| In sheets, 1c higher.

Lead.—
Pig....7½c | Lead Pipe, in full coils 9
Bar....8¼ | Lead Pipe, when cut.. 9½
| Sheet Lead.... 9½

Wire—Bright....dis 45%
Coppered....dis 40%

PITTSBURGH.

The following are the Card rates, f. o. b. in Pittsburgh of Lewis, Oliver & Phillips, H. B. Newhall, 11 Warren St., New York, Agent.

Merchant Bar Iron....card rates net
Flat Rail (1¼x¼), punched and coun'sunk..3½c ℔ ℔ net
Iron Wedges....3½c ℔ ℔ net
Norway Nail Rods, Vasa....7 c ℔ ℔ net
Iron Crow Bars (in ordering please state whether "Wedge" or "Pinch" point)...4 c ℔ ℔ net
Beetle Rings....5¼c ℔ ℔ net
Fence Pickets—
⅝ r'nd, bent to shape, 25c ℔ ft. of fence, less 15% off net
Discount off Standard List.
Carriage and Tire Bolts, $500 worth purchased in six months, ending July and Jan. 1....75, 5&3% off net
Stove Bolts....40% off net
Elevator Bolts....30% off net
Machine and Square Head Bolts....60% off net
Coach and Lag Screws....60% off net
Bolt Ends....60% off net
Pat. Hot Pressed Sq. and Hex. Nuts....7½c ℔ ℔ off net
Washers, all made from new band iron..7½c ℔ ℔ off net
Nuts and Washers in 25 lb. boxes, ½c ℔ ℔ ex. Nuts and Washers in lots less than one keg each size, ½c ℔ ℔ ex.
Nuts and Washers in 5 lb. boxes, 1c. ℔ ℔ ex.
Standard Caps, for Plows....4½c. ℔ ℔ net
Iron Harrow Teeth, in lots of 1 ton or more, packed in 200 lb. boxes, 1 in. diam. 2½c ℔ ℔ net; ⅞, ¾ in. diam. 2¾c ℔ ℔ net; ⅝ in. diam. 3c ℔ ℔ net.
Pat. Headed Harrow Teeth, packed in boxes, ½c ℔ ℔ ex.
Skein Bolts, in bulk, in lots of 1 keg or more, ⅜ in. diam. 4½c ℔ ℔ net; 9-16 in. diam. 5½c ℔ ℔ net; ½ in. diam. 6½c ℔ ℔ net. ½c ℔ ℔ extra when less than 1 keg of each size is ordered.
Screw Hook and Eye Hinges, with Pat. Hooks, ⅜ to 1 in. diam., 7c ℔ ℔ net; ⅜ in. diam., 8c ℔ ℔ net; ½ in. diam., 10c ℔ ℔ net.
Screw and Strap Hinges—all sizes under 28 in. long have Pat. Hooks 14 to 36 in. long, 3 4-10c ℔ ℔ net; 6, 8, 10 and 12 in. long, 4 9-10c ℔ ℔ net.
Strap & T Hinges....60&10% off net
Hereafter we will not make any allowances for freight on Strap and T Hinges; our price on them is F. O. B. in Pittsburgh.
Screw Hitching Rings, light, with ¼ ring, No. 1, $4·00 ℔ 100 net; heavy, with 5-16 ring, No. 2, $4·50 ℔ 100 net.
Bridge and Roof Bolts—
1 to 2 in. diam. over 8 ft. long....℔ ℔ 3½c net
1 to 2 in. diam. from 4 to 8 ft. long.... " 3½c net
1 to 2 in. diam. from 1½ to 4 ft. long.... " 3⅞c net
⅝, ¾ and ⅞ in. diam. over 4 ft. long.... " 4 c net
⅝, ¾ and ⅞ in. diam. from 1½ to 4 ft. long " 4½c net
Bridge bolts with upset ends....¾c. ℔ ℔ extra
Wrought Iron plates, punched....4½c. ℔ ℔ net
Cast Iron Washers....℔ ℔ 3½c net
Grass Rods....7½c ℔ ℔ net
Heel Bolts....8½c ℔ ℔ net
Duck Nest Tuyere Irons....$13·50 ℔ doz net
Wrought Iron Repair Links....15% off net
" Rings....50% off net
" Lap Rings....33⅓% off net

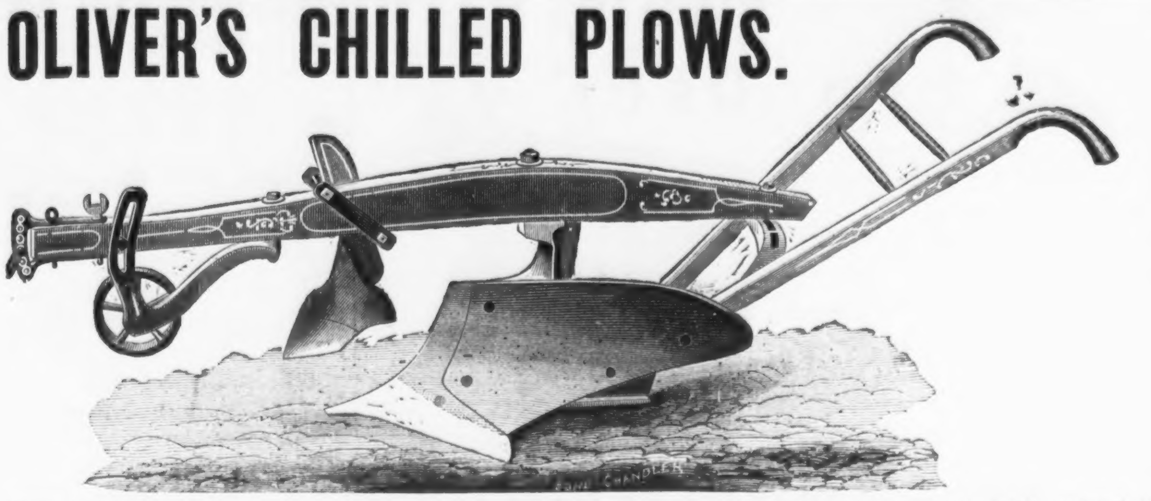
WAGON HARDWARE.

Single Trees, Neck Yokes and Double Trees, made from best selected Hickory, and ironed complete, in the most approved patterns.
No. 1 Southern Plow Single Tree, Ironed complete, Irons all Wrought....each, 38c net
No. 2 Western Plow Single Tree, Ironed complete, Irons all Wrought....each, 50c net
No. 3 Wagon Single Tree, Ironed complete, Irons all Wrought, except Malleable Ferrule....each, 60c net
No. 4 Wagon Single Tree, Ironed complete, Irons all Wrought; Improved End Pieces riveted on; one side acts as a wear iron for wheel to rub against....each, 60c net
Neck Yoke, Ironed complete, Irons all Wt., except End Ferrules, with Wt. Iron Rings.each, 70c net
Southern Plow Double Tree, ironed complete, irons all wrought....each, 60c net
Wagon Box Strap Bolts—For Orders of 50 Set, 45% dis.

Length		Diam.					
10 in. long by		7-16 at Screw End, ℔ set of		8 bolts..			45c
12	"	½	"	"	8	" ..	55c
10	"	9-16	"	"	8	" ..	65c
12	"	9-16	"	"	8	" ..	70c
14	"	9-16	"	"	8	" ..	80c
10	"	⅝	"	"	8	" ..	80c
12	"	⅝	"	"	8	" ..	80c
14	"	⅝	"	"	8	" ..	90c
16	"	⅝	"	"	8	" ..	1·00
18	"	⅝	"	"	8	" ..	1·10
20	"	⅝	"	"	8	" ..	1·20

5c ℔ set for each additional inch over 14 in. All lengths made.
In ordering Box Strap Bolts please give diameter at Screw End.
Wrought Iron Bolster Plates, 2¾ in. wide, ℔ set....45c
" " " 3 " " 50c
" " " 3¼ " " 55c
" " " 3½ " " 60c
Wrought Hammer Straps, heavy pattern, each....13 c
" " " light " each....12 c
" Rub Irons, each....9 c
Double and Single Tree Clips, figure 1, each....8 c
" " " " 2, each....9 c
" " " " 3, each....11 c
Pole Caps, each....20c
Strap Bolts, Bolster Plates, Hammer Straps, Rub Irons Clips and Pole Caps, in lots of 50 sets....dis 45%
For each order amounting to $200 net, or over, for the following goods: Wagon Hardware, Carriage and Tire Bolts, Rivets, Skein Bolts, Nuts, Washers, Chains, Bevel Box and Tongue Cap Iron, we will allow an extra discount of 10 per cent. off all Wagon Hardware, subject to discount, comprised in the order. Jobbers who do not deal in iron, we allow to substitute Strap and T Hinges in lieu of Bevel Box and Tongue Cap Iron to make order up to $200 worth and secure the extra discount of 10 per cent.
Single Tree Hooks, Nos. 1 and 2....each, 3½c net
Single Tree Irons, New Pattern....each, 4½c net
Stay Chain Hooks....each, 3½c net
Wagon Box Rods, narrow track, with Pat. Collar....each, 7½c net
Wagon Box Rods, wide track, with Patent Collar....each, 8½c net
Wagon Brake Ratchets....each, 7 c net
" " " finished with guard..each, 20c net
Single Tree Iron, Wt. Hook, Malleable Ferrule....each, 7½ net
Single Tree Iron, Wt. ⅜ Hook and 7-16 Clip, each, 7c net
Single and Double Tree Iron, Wrought Center Clip, ⅜ in. Welded, with ⅜ in. Ring...each, 10c net
Southern Plow Center Clip, ⅜ in. Welded, and 7-16 End Clip with 5-16 in. Hook—per set of 3 pieces. 20c net
Neck Yoke End Ferrule, Malleable, with Wt. Iron Ring....each, 6½c net
Neck Yoke Attachment, with plates complete....each, 23c net
Axle Tree Clips, No. 1....each 2¾c net
" " No. 2.... " 3¼c net
" " For Farm and Lumber Wagons, Shank, 9-16 in., flat part 1⅛ in....each, 6¾c net
Plow and Wagon Clevises....℔ ℔ 7c net
California Tire Rivets and Burrs, 5-16.... " 10c net
" " " " ¼.... " 11c net
Wagon Box Staples, 1½ to 2½ in. to clinch. ℔ 1000 $10·75 net
" " " Bevel Box Iron, to rivet on, ℔ 1000 7·25 net
Neck Yoke Eyes, each....4½c net
" " with ⅜ rings, each....7c net
King Bolts, ⅞, 1, 1⅛, and 1¼ in. diam....℔ ℔ 3½c net
Wagon Rivets, ex. large flat, oval and steeple head, ¼ in. diam., 1 in. and longer.... " 7 c net
Wagon Rivets, 3-16 in. diam., 1 in. and longer " 8 c net
" ⅜ to 1 inch long....℔ ℔ 1c extra
" & Nails, in 5 ℔ paper boxes.... " 1c extra
" " in 25 ℔ wood " .... " ½c extra
Wagon and Hinge Nails, pointed by hand—
¼x3 and longer. 2½ & 2¾ 2 & 2¼ 1¾ and shorter.
11c ℔ ℔. 13c ℔ ℔. 15c ℔ ℔. 17c ℔ ℔ net
3-16x3 and longer. 2½ & 2¾ 2 & 2¼ 1¾ and shorter.
12c ℔ ℔. 14c ℔ ℔. 16c ℔ ℔. 18c ℔ ℔ net
Wagon Rivets and Nails, in less lots than one keg each size....℔ ℔ ½c extra
Double Tree Plates.... " 7½c net
Coupling " .... " 4½c net
Tongue " .... " 7¾c net
Neck Yoke Plates.... " 8¾c net
Tongue Cap Iron, 1¾, 2 & 2¼ in. wide, same price ℔ ℔ as No. 12 Band Iron.
Sand Band Iron, 1½ in. wide, same price as No. 12 Band Iron.
Hub Band Iron, ½c ℔ ℔ over price of same size Band Iron.
Wagon Chains, Stay, Lock and Tongue, 5-16 in., ℔ ℔ 7c net; ¼ in., 8c net.
Our prices are all subject to change of market, without notice.

OLIVER'S CHILLED PLOWS.



Every dealer and hardware house should know about them. They are the most durable, lightest draft, easiest to handle, and do better work than any other Plow. Sales have doubled annually the past six years. Over 100,000 now in use. For terms and circulars, address

SOUTH BEND IRON WORKS, South Bend, Ind.

CLARK'S PATENT EXPANSIVE BITS

Made of JESSOP'S BEST CAST STEEL, and warranted superior to any other
Two sizes: Large Size Boring, ⅞ to 3 inches; Small Size Boring, ½ to 1⅛ inches.

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MANUFACTURERS OF

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SCOOPS.

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Also, manufacture all kinds of

BACK STRAP GRAIN SCOOPS

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Smooth Back and Back Strap

SHOVELS and SPADES.

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27th and Railroad Streets, PITTSBURGH, PA.

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L. M. RUMSEY & CO., St. Louis.
POTTER & HOFFMAN, Philadelphia.

OLD COLONY IRON CO.,

Taunton, Mass.,

MANUFACTURE

Nails, Shovels, Spades, Scoops, &c.

SOLID CAST STEEL GOODS MADE TO ORDER.

Warehouse, 211 Pearl St., N. Y.

P. O. Box 1267. **A. L. REID, Agent.**

Morse Twist Drill and Machine Co.,

NEW BEDFORD, MASS., Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,

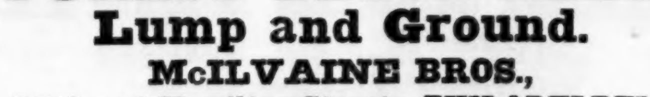
Beach's Patent Self-Centering Chuck, Solid and Shell Reamers.

BIT STOCK DRILLS,

Drills for Coes, Worcester, Hunter and other Hand Drill Presses. Beach's Patent Self-Centering Chucks, Center and Adjustable Drill Chucks, Solid and Shell Reamers. Drill Grinding Machines. Taper Reamers, Milling Cutters and Special tools to order.

All Tools exact to Whitworth Standard Gauges.

GEO. R. STETSON, Supt. EDWARD S. TABER, Treas.



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McILVAINE BROS.,
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REMINGTON AGL. CO.

The most complete Wheel Horse Rake ever made. Cheap, light and warranted good. No side draft. Dumps at any hight. Can be set to glean or rake heavy grass. Dumps with the foot; hand dump also. Best steel teeth and most approved tooth holder. Easy draft. Works perfectly and not liable to get out of order.

Plows, Hoes, Garden Rakes, Mowers and Agricultural Implements generally.

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THE "DUCKHAM" PATENT

Suspended Self-Indicating

WEIGHING MACHINE.

Capacities from 1 to 100 tons.

This machine is used on a crane or any lifting apparatus, and indicates the weight on the dial directly the article is lifted. It is accurate, requires no adjusting, portable, and the greatest labor-saving weigher ever introduced.

Send for Circular and Price List.

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Hydraulic Presses, Accumulators, &c.

246 to 250 Plymouth St., Brooklyn, N. Y.

Fairmount Machine Works,
OFFICE, 2106 WOOD ST., PHILADELPHIA.
THOMAS WOOD,
Manufacture as specialties
POWER LOOMS,
Beaming, Spooling, Dyeing and Sizing Machines, Bobbin Winding Machines; Wind direct from the Hank to Shuttle Bobbin; Self-Acting Wool-Scouring Machines, Lard and Paraffine Oil Presses,
SHAFTING
With Patent Self-Oiling Hangers,
Pulleys from 4 inch to 10 feet in diameter,
Pulleys in two parts.
Power Hoisting Machines.
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PIONEER IRON WORKS,

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Manufacturers of the A. Lindelof Patent Steam Road Roller and Traction Engine. All kinds of Paving Machinery. Machinery for Sugar Houses and Plantations a specialty.

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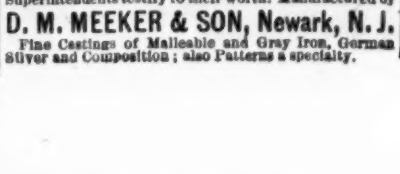
For Insane Hospitals, Fire Proof Buildings, &c.



The use of these Sashes gives perfect security without the usual gratings that have a prison-like appearance. Wherever introduced both Architects and Medical Superintendents testify to their worth. Manufactured by

D. M. MEEKER & SON, Newark, N. J.

Fine Castings of Malleable and Gray Iron, German Silver and Composition; also Patterns a specialty.

BOSTON.

Reported by Macomber, Bigelow & Dowse, 156 to 164 Oliver St.

Anvils.—"Eagle American" ......per lb. 9c; dis 20 %
Augers.—Watrous Ship ......dis 10 %
L'Hommedieu Ship ......dis 30 %
Axes.—Blue Jacket 9 00
Racer 8 00
Red Cross, Handled 10 50
" " Boy's 9 00
Blue Jacket " 10 00
Axe Handles.—Wadleigh's Oak—A (Extra) $2·50. B (No. 1) $2·00. C (No. 2) $1·50 ⅌ doz
Blind Hinges.—Orr or Washburn's.. ⅌ hun'd sets $8
Blind Fasts.—
Orr or Washburn's ......per hundred set $6 00
Bolts.—Carriage, Phila ......dis 60&20 %
Carriage, Common ......dis 75&10 %
Borax.—Best Refined ......⅌ ℔ 11c
Borers.—Angle. Backus' ......dis 30 %
Boring Machines.—Angle ......each $4 50
Common. Snell's quality ......each 3 50
Braces.—Barber's ......dis 40&5 %
Backus' ......new list 50&10
Spofford's ......dis 50 %
Bracket
Saw Frames, with patterns complete ......⅌ doz $6 00
Saws ...... " 88
Saw Frames, Centennial ...... " 3 50
Star Bronzed ......new list net
Star Japanned ......new list net
Store Shelf ......new list net
Brass Faucets.—L. F. & C. ......dis 40 %
Brushes.—Horse, Patent Metallic ......per doz. $4·50
Butts.—Union Drilled Loose Joint ....dis 45, 12½&10 %
" " Wire Fast Joint. dis 25, 12½&10%
" " Acorn Loose J't. dis 45, 12½&10 %
Brass Butts ......dis 30 %
Wrought Table Butts and Back Flaps ......revised list, dis 35 %
Wrought Narrow Butts ......reduced, dis 40 %
Cards.—
Curry Cards, No. X, per doz., $0·75 ......dis 30 %
Horse " No. X, " 0·80 ......dis 30 %
Wool " No. 8X, " 2·50 ......dis 15 %
Cotton " No. 10, " 3·50 ......dis 10 %
Cartridges.—U. S. Cartridge Co. ......dis 60 %
Chisels.—"Buck Bros." Shank Goods ......dis 30 %
Socket ......dis 25 %
Compasses and Dividers.—Bemis' ......dis 40 %
P. S. & W. ......dis 30 %
Cordage.—Manila (usual trade dis.) ......⅌ ℔ 14c
Corn Hooks ......per doz $2·75
Crow Bars.—Solid Steel ......⅌ ℔, 9c
Cow Ties ......dis 30 %
Dividers.—Cook's Nickel Plated ......dis 15 %
Door Springs.—Mosely—

Per doz.	$9·00	12·00	15·00	18·00	24·00
No.	0	1	2	3	4

Torrey's ......$2·50
Gem ......dis 10 %
Drills.—Whitney's with Chucks $12 50
Emery.—Alden ......⅌ ℔ 7c
Wellington Mills ......⅌ ℔ 10c
Files.—American ......dis 30 %
Nicholson, new list ......dis 30 %
Wheeler, Madden & Clemson ......$5 to £; 10 %
Stubb's Tapers, genuine, 3 in., $1·50; 3½, $1·62, $1·88; 4½, $2 13; 5, $2·50
Hammers.—Maydole—new reduced list ......dis 15 %
M., B. & D., solid cast steel, adze eye, No. 1, $10; 1½, $8·75 ......dis 25 %
M., B. & D., solid cast steel, bell face, No. 1 $11; 1½, $9·75.
Hammond—new reduced list ......dis 15 %
Hangers & Rollers.—Anti-Friction ......dis 40 %
Climax ......dis 40 %
Acme Rollers ......dis 40 %
Hatchets.—Underhill Edge Tool Co. ......dis 25 %
C. F. Dowse, warranted Cast Steel—
Shingling ......0, $4·75; 1, $5·25; 2, $5·75
Claw ......1, 5·75; 2, 6·25
Lathing ......1, $5·50
Axe Pattern ......1, $7·00; 2, 7·50
Broad ....0, $5·75; 1, $6·50; 2, $7·50; 3, $9·25; 4, $10·75; 5, $12·75; 6, $14·25
Hinges.—Strap and T Stanley Works ......60&5
Plate, Loose and Fast Joint ......⅌ ℔ 5c
Wrought Screw Hook ......⅌ ℔ 5c
Knobs.—Imp. Extension Silvered Glass ....⅌ doz $8·00
Lanterns.—Tubular No. 0 ......$ 9·50
Guarded, No. 7½, (with kerosene oil and candle burners) ......5·50
Lead.—Sheet, 9½c.; Pipe, 9c ......dis 10 %
Locks.—Norwalk Lock Co ......dis 35 %
Mattocks.—
K. P. & Co., axe finish, long cutter ......$11 50—net
Short cutter ......11 00—net
Meat Cutters.—"Miles's" Challenge ......dis 30 %
No. 1, $22·00; 2, $30·00; 3, $40·00.
Metal.—Babbitt ......No. 1, 35c; 2, 25c; 5, 15c ⅌ ℔
Nails.—10d and larger $2 60
Nail Pullers.—Little Giant—Small ....per doz., $22·00
Little Giant—Large ...... " 30·00
Padlocks.—Wilcox ......dis 33⅓&5 %
Picks.—K. P. & Co., Solid Eyes ......5 to 6, $9 00; 6 to 7, $9 50
Pins.—Universal Hat and Coat all wood—2 in ......⅌ gross $2·50; 3 in., 3 50; 4 in., 4 50—dis 15 %
Planes.—Auburn Tool Co ......dis 40 %
N. Y. Tool Co ......dis 50 %
Plated Ware.—Rogers Bros ......dis 40 %
Pocket Knives.—Conn. Cutlery Co ......new net list
American Shear Co ......new net list
Plumb & Levels.—Stanley ......dis 60&10 %
Pulleys.—Axle.
Fr'me pol. wh'l pt. face. No. 15, 1⅜ in., 20c.; 16, 2 in., 26c.
Pol. wh'l br'zed face No. 115, 1⅜ in., 20c.; 116, 2 in., 26c.
Pulley Blocks.—"Best Boston Make" ......net
Rail Barn Door.—For Novelty and Anti-Friction Hangers ......per foot 7c.. dis 40 %
Refrigerators—Heinz Patent ......dis 20 %
Rivets.—Black ......dis 40 %
Carriage, oval head, Nos. 3, 4, 5, 6, 7, 8, dis 30 %; 13 13 14 14 15 16c ⅌ ℔
Sad Irons.—Bless & Drake ......⅌ ℔ 3½c
Sand Paper ......dis 15 & 5 %
M. B. & D ......0 to 2, $4·25; 2 to 3, $4·75
Saws.—*Hand and Panel*—
X Cut, Wheeler, Madden & Clemson ......per ft., 35c
" Champion ...... " 45c
" Lightning ...... " 45c
" Great American ...... " 50c
Wood Saws, Welsh & Griffith ......⅌ doz $12·00
Wheeler, Madden & Clemson's, same list as "Diston's" ......dis. 20 %
Disston's ......dis. 20 %
Saw Horses.—Extra ......⅌ doz $2 25
Folding ...... " 3·50
Screws.—Am. Screw Co., new list Sept. 1st ....dis 60 %
Aiken's ......dis 60 %
Scythe Stones.—
"Willoughby Lake," first quality ......⅌ gross $6·50
" " second quality ...... " 3·00
Shovels.—O. Ames ......dis 30 %
M. B. & D ......dis 30 %
Spading Forks.—W. C. & Co ......dis 40 %
Tools.—Aiken's Pattern ......⅌ doz $5·00
Aiken's Genuine, $12 ......dis 40 %
" " Saw Sets, $13 ......dis 40 %
Traps.—Oneida ......dis 25 %
Blake's ......dis 40 %
Vises.—K. P. & Co.'s Solid Box. Blacksmith ....⅌ ℔ 12c
Parker's Parallel ......dis 10 %
Backus ......dis 25 %
"Howards," Parallel ......dis 25 %
Wardrobe Hooks.—Wire to drive ......⅌ gross $1 00
Weights.—Window Weights ......⅌ ℔ 1½
Wedges—Axe ......⅌ doz 3½
Wire.—
Eureka in spools. No. 28 to 40 assorted ...⅌ gross $8 ½
Wire Netting.—Clinton Wire Cloth Co., Green, 4½c
Drab or Black ......⅌ ft 4½c
Wrenches.—Genuine Wrenches, G. A. Coes, dis 40&10 %
Wringers.—Universal XX No. 2 ......⅌ doz $66 00
Novelty, No. 10 ...... " 63 00
" No. 2 ...... " 66 00
" No. 22 ...... " 70 00
Excelsior A, with bench ...... " 84 00
" E, set tubs ...... " 72 00
Eureka ...... " 57 00
Welcome ...... " 60 00
Witnington, Cooley & Co.—Hoes, Rakes, Forks &c. dis 40 %. Special rate for Export.

ST. LOUIS.

Corrected weekly by Semple & Birge Mfg. Co.

Animal Pokes ......$7·50 ⅌ doz. net
Apple Parers.—Conqueror ......⅌ doz $7 75
Hudson's Rotary ...... " 7 75
Axes.—Wm. Mann's, Red Warrior ......⅌ doz 9 75
"C. Marshall" ...... " 9 25
Handled ...... " $3 extra
Double Bitted ...... " 19 50
Hunt's ...... " 12 00
Axles.—"Jones, Henry & Co.'s" Patent Lubricating, Half Patent Swelled Taper, Plain Taper and Concord Axles ......dis 25&5 %
Common Axles (Pat. Lubricating), 1½ inch and upward ......⅌ ℔. 6c
do. less than 1½ inch ...... " 6½c
Babbitt Metal.—

Nos.	4	3	2	1	A 1	Genuine.
	9½	11	16½	20	31	34c ⅌ ℔.

Bellows.—Best St. Louis make ......45c ⅌ in. net
Bells.—Troy, Church, School and Farm Bells. ⅌ ℔ 35c
"Improved Amalgam Bronzed." 15 in., $2·00; 17 in., $2·50; 19 in., $4; 21 in., $5; 24 in., $14; 27 in. $19·50
Belting.—"Boston Belting Co.'s" Rubber. dis 50&10 %
Bradford & Sharp's" Oak-Tanned Leather .... dis 40 %
Boilers.—Farmer's Profit Feed Boilers ......dis 20 %
" Caldrons ......dis 25 %
" Sugar Kettles ......dis 30 %
Bolts.—Arms. Bell & Co.'s Carriage & Tire. dis 70 & 10
Butts.—Western Butt Co.'s new list—
Narrow Fast Joint ......dis 25, 12½&10 %
Broad Fast Joint ......dis 35, 12½&10 %
" Loose " ......dis 45, 12½&10 %
Reversible ......dis 40, 12½&10 %
" Japanned and Silver Tipped. dis 50, 12½&10 %
Loose Joint "Acorn" ......dis 45, 12½&10 %
Churns.—Julian, No. 2, $7·00; No. 3, $7·50; No. 4, $8·50 ......dis 25 %
Cider Mills.
American Senior. $29·00; Am Junior, $18·00 ......net
Corn Drill.—Campbell's Patent, $19·00 ......net
Corn Knives.—Dunn Edge Tool Co.'s Clip ...⅌ doz 4 50
Seymour Mfg. Co.'s Solid Steel Back ...... " 4 50
Corn Shellers.—Sandwich Mfg. Co.'s—
Power Shellers ......dis 10 %
Hand Shellers ......Special rates
Corn Stalk Cutters.
Pekin Single Row Machine, $50 ......dis 20 %
" Double Row " $75 ......dis 20 %
Cotton Gins.—Carver, with 10 in. Saws, $3·75 a Saw. net
12 in. Saws, $4·00 a Saw ......net

Crow Bars.—Steel Pointed ......⅌ ℔ 6c
Drag Saw Machines.
Culver's Iron Drag Saw ......dis 15 %
Excelsior Drag Saw with Log Trucks ......dis 12½ %
Fanning Mills.—Nash & Cutt's ......dis 25 %
Feed Cutters.—Improved Burdick National ..dis 20 %
Sanford No. 1, $10 00; No. 2, $8 00 ......net
Bowman's Lever Cutter, $6·50 ......net
Files.—Black Diamond, Mill ......$5·00 & currency
" Bastard ...... 5·00 & currency
" Taper ...... 5·00 & currency
Forges and Blowers.
Keystone Portable Forge Co.'s ......new list
Forks and Hoes.
Auburn Mfg. Co.'s Hay and Manure Forks ......dis 40 %
" " Handled Hoes ......dis 40 %
Garden Seed Drills and Wheel Hoes.
Allen's Double Wheel Hoe ......dis 20 %
" Planet Drill, Nos. 2 and 3 ......dis 20 %
" Combined Drill and Wheel Hoe ......dis 20
Grinding Mills.—Challenge Feed Mills ......dis 15 %
Sedgebeer's Nonpareil Mills ......dis 15 %
Bradford's French Burr Mills ......net list
Hammers.—Masons' Hammers ......⅌ ℔ 19c
Smiths' Hand ...... " 20c
Handles.—No. 1 Fork, Hoe and Rake ......dis 25 %
No. 2 Fork, Hoe and Rake ......dis 30 %
Ax, Pick, Sledge and Small Handles ......net list
Hay and Cotton Presses.
Dederick's Railroad ......net list
" Perpetual ......net list
Hay Knives.
Dunn Edge Tool Co.'s ......⅌ doz $12 00 net
Lightning (Weymouth's Patent) ......⅌ doz $9 00
Horse Hay Fork.—Nellis' Harpoon ...$8·50 each net
Horse Nails.—National Patent Pointed ......20c rates
National Patent Pointed, extra finished ......22c "
Horse Powers.—Pitts or Carey's Patent ......dis 10 %
Wheeler's Railway ......dis 10 %
Sandwich Lever ......dis 10 %
Hose.—
Boston Belting Co.'s Rubber Medium Sizes. dis 30&10
" " " S. Siz. Hydrant..dis 40
Mattocks and Grub Hoes.
Klein, Logan & Co.'s Mattocks ....⅌ doz $11 75 @ 13
" Grub Hoes, oval eye " 8 30 @
Money Drawers.—
Pierpont & Co.'s Excelsior ......per doz $38·00 net
Nails.—Wheeling Riverside Brand ......$2·80 rates
Packing.—Boston Belting Co.'s Rubber, Plain..dis 30 %
Boston Belting Co.'s Rubber, Pure ......dis 25&5 %
" " No. 3 Plain ......dis 40 %
" " Round and Square ....dis 10&10 %
Picks.—Railroad and Clay ......⅌ doz $8 50 @ 10 00
Coal ...... " 7 45 @ 8 40
Poll ...... " 11 60 @ 13 85
Stone ...... " 14 40 @ 14 90
Tamping ...... " 14 75 @ 15 35
Miners' Drifting ...... " 75 @ 11 75
Plows.—Avery's Cast and Steel ......dis 20 %
Avery Sulky Plow ......dis 20 %
Collins Cast Cast Steel ......new list net
Pekin Steel ......dis 25 %
Plow Sulky.—Buckeye ......$29 25 net
Post Hole Augers.—Clark's Patent—
No. 1, ⅌ doz. $27; No. 2, $30; No. 3, $32 ......dis 20 %
Pulleys.—5 inch ......per doz $3·70 net
6 inch ......per doz 2·50 net
Nellis' Patent ......dis 20 %
Pumps.—St. Louis. Farm, Patent Metal Lined..dis 30 %
Rakes.—Advance Paddock Sulky ......each $25 00 net
St. Louis Revolving 14 tooth ...... 4 45 net
" " 16 " ...... 4 65 net
" Hand Hay Rake ......per doz $2·50
Reaper Knives and Sections.—
Geo. Barnes & Co.'s Knives ......dis
" " Sections ......dis 40 %
Road Scrapers.—Steel ......each $3·50 net
Cast Iron ......dis 10&5 %
Saws.—Curtis & Co ......dis 15 %
Scythes.—Dunn Edge Tool Co.'s ......dis 30 %
Scythe Stones.—No. 1 Ind'n Pond ⅌ gr's, $7 00
Extra Indian Pond ...... " 7 50
Premium ...... " 10 50
Diamond Grit ...... " 13 00 } dis 25
Shovels and Spades.—Groom Shovel Co. ..dis 40 %
Grain Scoops—Patent Cor'd Straps Groom Shovel Co ......dis 40 %, and 50c per doz extra
do. M. Rowland & Co., dis 30 % and 75c "
do. O. Ames & Son, dis 27½ % and 75c "
Sledges.—Smith's Stone or Coal Sledges—
Steel Face Polished ......⅌ ℔ 15c net
Solid Cast Steel ...... " 10c net
Snaths and Cradles.—Seymour Mfg. Co.'s ..dis 30 %
Sorghum Machinery.—Bell Cane Mills ....dis 25 %
Scantlin's Seamless Evaporators ......dis 15 %
Springs.—Cleveland Spring Co.'s—
Carriage and Express ......⅌ ℔ 11
Blue Seat Springs ......⅌ pair, $1
Thimble Skeins.—Whitewater's ......dis 40&10 %
Vises.—Wilson Mfg. Co.'s ......⅌ ℔. 14½
Wheelbarrows.—Champion Iron Wheel. ⅌ doz $31·0
Champion Wood Wheel ......⅌ doz 29·0
" Garden ......⅌ doz. 30
Wagons.—Whitewater Farm Wagons—
Thimble Skein ......3 in. $74; 3¼ in. $78; 3½ in. $79
Iron Axle ......1½ in. $78; 1⅝ in. $81; 1¾ in.
Wire Bale Ties.—Buckeye Double Twist....net list
Dederick Adjustable ......net list

St. Louis Metal Market.

(Corrected Weekly by Messrs. R. S Ilew & Co.)

Tin Plate.

IC, 10x14, Best Char	$ 8·00	IXXX, 14x20, B. Char.	$15·50
IX, 10x14, "	10·50	IXXXX, 14x20, "	18·00
IC, 12x12, "	8·00	IC, 20x28, "	20·00
IX, 12x12, "	10·50	IX, 20x28, "	25·00
IC, 14x20, "	8·00	IXX, 20x28, "	31·00
IX, 14x20, "	10·50	IC, 14x20, Best Roof	7·50
IC, 12x24, "	9·00	IX, 14x20, "	10·00
DX, 12½x17, "	10·50	IC, 20x28, "	15·50
DXX, 12½x17 "	13·00	IX, 20x28, "	20·00
IX, 14x14, "	19·00	IC, 10x14, Best Coke	7 00
IXX, 14x14, "	22·00	IC, 14x20, "	7·00
IXX, 14x20, "	13·00	IC, 10x20, "	11·50

Sheet Iron.	Com'n.	S L U Sm'th.	D. Ref'd Sm'th.	Juni'a Sm'th.
No. 16 to 20	3·4c	4·4c	6c	7·9c
No. 22 to 24	3·6c	4·4c	6c	7·5c
No. 26	3·8c	4·6c	6¼c	8·1c
No. 27	4 c	4·8c	6½c	8·3c

Genuine Russia Iron.
Perfect—No. 9, 10, 11, 12 ......per lb. 14c
No. 1 Stained—No. 9, 10, 11, 12 ......per lb. 12c
Tare 22 lbs. to Bdle. For less than Bdle. add 1c. ⅌ ℔.
Patent Planished Iron.
No. 24 to 27, A quality ......per lb. 13c
" B " ...... " 10c
For less than Bdle. add 1c. per lb.
Galvanized Sheet Iron.
Juniata, or 1st quality ......dis 35 %
Block Tin.
Straits, Large Pigs ......23c | Straits, Small 24c
Eng. Ref'd, Large Pig ......23c | Bar 25c
do Small 24c
Solder.
Extra in Bars ......15c | No. 2, in Bars 13c
No. 1, in " ......14c | in Bars 8½c
Pig Lead—Pigs 7c
Antimony 18c
Bismuth $3 00
Nickel 3 50
Crucibles.—Dixon's ......⅌ No. 5c
Babbit Metal.
No. 1 ......⅌ ℔. 20c | No. ......⅌ ℔ 14c
" 2 ...... " 18c | " ...... " 9c
Copper.
Brazier's, 30x60, 14 to 100 lbs. Sheets 32c
" " 10, 11 & 12 lbs., " 34c
" " 8 and 9 lbs. " 36c
" " 6 and 7 lbs. " 38c
Tinned, 14x48, 14 and 16 oz 42c
Planished, 14x48, 14 and 16 oz 39c
" Boiler Sizes, 14 and 16 oz 41c
Gutter Copper, 20x72, 10 and 12 ℔. Sheets 34c
" 20x72, 14 ℔. Sheets 32c
" 24x72, 10 and 12 ℔. Sheets 34c
" 24x72, 14 ℔. Sheets 32c
Reservoir Copper, 16x60 and 18x60 ......32c
Bar Copper, Square and Round, ½ to 1⅛ inch 33c
" " ⅜ inch 36c
Copper Bottoms 34c
Copper Nails 45
Brass.
Roll, No. 18 to 28, 12 in. in width 30c
" 30, 12 in. in width 31c
" 32, 16 " 36c
" 34, 16 " 37c
" 36, 16 " 34c
Platers, No. 40, 6 " 58
Brass and Copper Wire.

	Brass.	Copper.		Brass.	Copper
No. 0 to 20	34c	45c	No. 24	39c	50
" 21	35c	46c	" 25	42c	53
" 22	36c	47c	" 26	44c	56
" 23	37c	48c	" 27	46c	60c

Brass Spring Wire, 2c. ⅌ ℔ advance.
Brass Tubing.
Plain to No. 20 ......45c | 5-16 inch 80c
⅜ inch ......50c | ¼ " 85c
Copper Rivets and Burs ......dis 10 %
Brass Kettles ......⅌ ℔ 43c
Sheet Zinc.—600 lbs. cask ...... " 7¾c
250 lbs. cask ...... " 8¼c
Sheet ......new " 8½c
Wire.—Iron, Bright Market ......new ...dis 50 %
Iron, Coppered Market ...... " ..dis 45 %
Fence, Nos. 7, 8 and 9 ...... " ⅌ ℔ 4½c
Trellis, Nos. 10 and 11 ...... " 5½ c
" No. 12 ...... " 5¾c
Hay Baling, Charcoal, No. 10 and 11 ...... " 5½c
" " No. 12 ...... " 5¾c
Broom, Tinned, Nos. 18 to 22 ...... " 17c
Fence Staples ......per keg of 100 lbs. $6·25
Per lb 6¾c
Iron Rivets.—Black, papered ......new dis 25 %
Tinned, papered ...... " dis 25 %

In bulk ....new	3-16	¼	5-16	⅜ in. diam.
	11¼c	10½c	10 c	9¼c per lb.

Sad Irons ......⅌ ℔ 3¼c
Enameled Kettles.—Standard Mfg. Co ....dis 55 %
Enameled Sauce Pans.
Standard Mfg. Co ......dis 40 %
Enameled Boilers.—Standard Mfg. Co ....dis 40 %
Dripping Pans.—Smooth Iron ......⅌ ℔ 10c
Geneva Fluters ......per doz $15 00
Monroe Fluters ...... " 14 50
Stove Polish.—Dixon's ......per gross 6 00
Gem 4 50
Japanese 3 50
Dixon's, in bulk ......⅌ ℔ 3
Coffee Mills.—Parker's ......dis 20 %
Granite Iron Ware ......dis 25 %
Spoons.—New list ......dis 10 %
Retinned Iron Ware ......dis 33⅓ %
Plain Stamped Ware ......dis 30 %
Japanned Ware.—St. Louis list ......dis 40 %
Fry Pans ......dis 50 %
Ears ......dis 60

THE JUDSON GOVERNOR.

It is a common method to advertise Governors *without cost*, unless satisfactory to the customer, and then charge *High Prices* for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

Reduced Price List,

FEBRUARY 1, 1877.

☞ For dimensions of Governor, see Illustrated Price List.

THE JUDSON PATENT

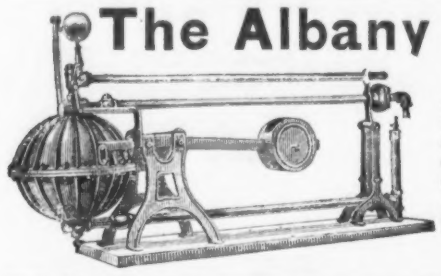
Improved Steam Governor.

Size, Inch.	Plain.	Bright Finished.	Extra for Sped'r	Stop Valve.
½	$16 00	$18·00	$1·90	..
¾	18·00	20·00	1·90	..
1	20·00	22·00	2·00	$5·00
1¼	23·00	26·00	2·25	6·00
1½	26·00	30·00	2·50	8·00
2	31·00	35·00	2·75	10·80
2¼	36·00	41·00	3·25	12·00
2½	40·00	45·00	3·50	14·00
2¾	45 00	51·00	3·75	16·00
3	50·00	57·00	4·25	19 00
3½	59·00	67·00	4·50	23·00
4	69·00	78·00	5·00	28·00
4½	80·00	90·00	5·50	34·00
5	90·00	101·00	6·00	40·00
5½	105·00	117·00	6·50	46·00
6	120·00	133·00	7·00	54·00
7	142·00	156·00	8·00	65·00
8	175·00	192·00	9·00	79·00
9	198·00	218·00	10·00	..
10	210 00	240·00	12·00	..

No Charge for Boxing & Cartage.

JUNIUS JUDSON & SON, Rochester, N. Y.

The Albany Steam Trap.

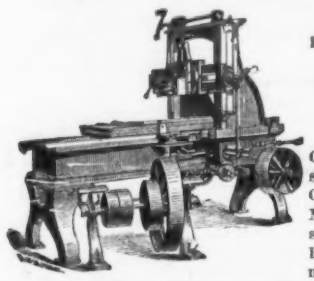


This Trap automatically drains the water of condensation from *Heating Coils*, and returns the same to the Boiler *whether* the Coils are *above or below* the water level in Boiler, thus doing away with pumps and other mechanical devices for such purposes. Apply to

Albany Steam Trap Company,
Albany, N. Y.

The Pratt & Whitney Co.,

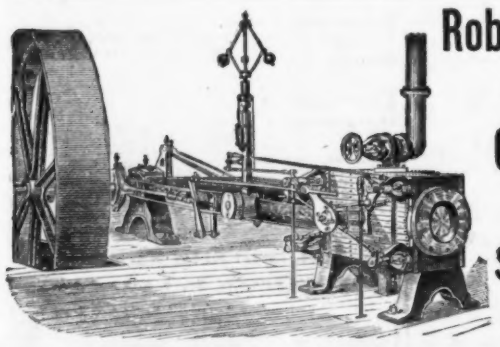
Hartford, Conn.,



Have constantly on hand and making

Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.



Robt. Wetherill & Co

CHESTER, PA.

Corliss Engine
BUILDERS.
Shafting & Gearing,
Boiler Makers.

DETACHABLE
DRIVE CHAIN
Wheels and Attachments

Positive transmission.
Stands **Exposure.**
Noiseless in service.

NO **Friction.**
Tension.
Stretching.

Runs **Fast** or **Slow,**
on all size wheels.
Runs **Perpendicularly.**

For carrying **Buckets** and **Attachments** it has no equal.

Is a **Profitable Substitute** for Belting, Shafting, Gears and Ropes.

Adapted to all kinds of **Machinery.** Finds various uses in **Mills, Mines, &c.**

☞ Plans for any purpose furnished on application. ☜

Send for new Catalogue and Price List for 1877.

EWART MANUFACTURING CO.,
89 Madison Street, CHICAGO.

J. C. COONLEY, Prest. & Treas. W. D. EWART, Gen'l Sup't. J. F. POTTER, Sec'y.

THORNE, DeHAVEN & CO., Drilling Machines,

21st Street, above Market, Philadelphia.

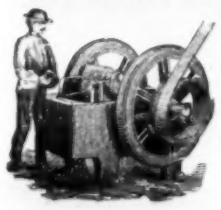
PORTABLE DRILLS. Driven by power in any direction.
RADIAL DRILLS. Self-feed—Large Adjustable Box Table.
VERTICAL DRILLS. Self-feeding.
MULTIPLE DRILLS. 2 to 20 Spindles.
HORIZONTAL BORING AND DRILLING MACHINES.
HAND DRILLS. CAR BOX DRILLS.
SPECIAL DRILLS. For Special Work.

H. H. HARVEY'S HAMMER AND TOOL WORKS,
Augusta, Me.

SPECIALTIES.—Stone Cutters' Hammers and Tools, Quarrymen's Drills, Wedges and Half Rounds, &c., &c., &c., Miners' Hammers and Tools, Blacksmiths' Hammers and Tools, Patent Hammers for picking burr stone. Also the common Mill Picks and Wood wedges Steel or Iron, H. H. Solid eye Picks, with one lb. of best Cast Steel inserted in each pick. The above goods are warranted inferior to none, both in quality and style of finish. All hammers have true eyes and polished faces, and are made from solid cast steel. No charge is made for boxing or carting at Augusta; shipping facilities are excellent. Hammers made to any pattern or drawing. Capacity of works, one ton of hammers per day. A full line of the above goods constantly in stock. Catalogue on application.

BLAKE'S PATENT
STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength



For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect McADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS It is extensively in use in MINING operations, for crushing

IRON, COPPER, ZINC, SILVER, GOLD, and other ORES.

Also for crushing **Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barytes, Manganese, Phosphate Rock, Plaster, Soapstone, &c.**

For Illustrated Circulars, and particulars, address,

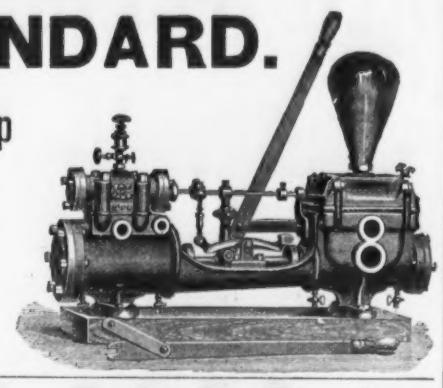
BLAKE CRUSHER CO., New Haven, Conn.

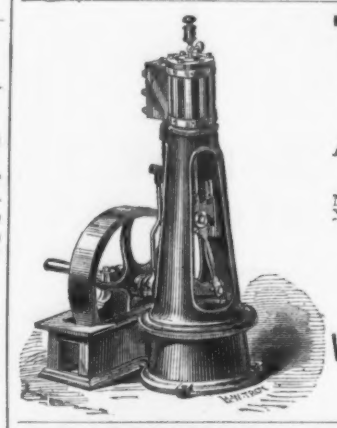
KNOWLES'
THE STANDARD.

Knowles Steam Pump Works,

92 & 94 Liberty St.,

NEW YORK.





The C. O. D. Engine

COSTS LESS

And is equal to any Engine in the market.

ALL WORKING PARTS WELL FINISHED.

No. 1, Cylinder 4x6..... $125·00
No. 2, " 5x7..... 150 00

MANUFACTURED BY

J. AUSTIN & CO.,
115 Liberty St., New York.

Also, Proprietors and Manufacturers of

Wheatcroft's Self-Adjusting Pipe Wrench,

AND

SCRIPTURE'S FUNNEL TOP OILERS.

Keystone Pressure Blowers.

Anti-friction and noiseless; maximum blast and minimum power; all sizes for

Forges, Foundries, Rolling Mills, &c.

ALSO

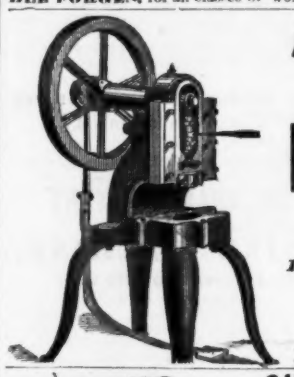
KEYSTONE EXHAUST BLOWERS.

Made on same principle,

For Ventilating Mines, Buildings, etc.; Removing Dust, Shavings, etc.; Drying Wool, Lumber, etc. Every Blower Guaranteed. Send for circular, or call and see them in operation.

KEYSTONE PORTABLE FORGE CO.,
218 Carter Street, Philadelphia.

Also, sole manufacturers of the celebrated **KEYSTONE PORTABLE FORGES,** for all classes of work, from the lightest to the heaviest.



A. H. MERRIMAN,

Patent Power

Punching Presses.

Patentee and Sole Manufacturer.

I warrant every part of this Machine to stand the shock of the wheel running at 125 revolutions.

West Meriden, Conn.

Machinery Hall, Philadelphia, Section B 4, Columns 28 and 29.

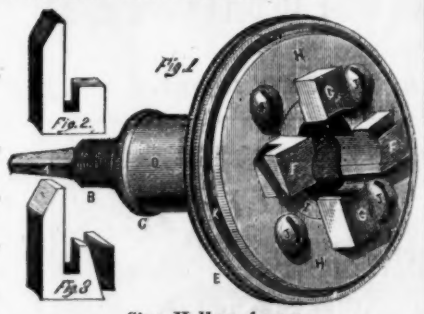
Improved Blacksmith Drill.

SILVER & DEMING MFG. CO.,

SALEM, OHIO, Manufacturers of

Improved TOOLS for the Use of Carriage and Wagon Makers and Blacksmiths.

Hub Boring Machines,
Hollow Augers,
Spoke Tenoning Machines,
Blacksmith Drills,
Adjustable Clamps,
Water Tuyere Irons.



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Star Hollow Auger.

HAMMER & CO.,

Branford, Conn.,

Manufacturers of the following *Patented* Articles of

MALLEABLE IRON:

Hammer's Adjustable Clamps.
Hammer's Malleable Iron Oilers.
Hammer's Mall. Iron Hand Lamps.
Hammer's M. I. Hanging Lamps.

For Sale by all the principal Hardware Dealers.

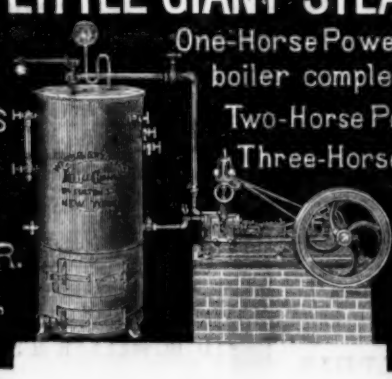
Malleable Iron Castings

Of superior Quality and Hardware Specialties in Malleable Iron made to order.

SNYDER'S LITTLE GIANT STEAM ENGINE

The Best SMALL POWER ENGINES IN THE COUNTRY.

Manufactured by WARD B. SNYDER. 94 Fulton Str, NEW YORK.

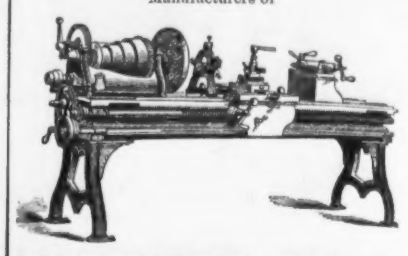


One-Horse Power, with tubular boiler complete, only... $150.
Two-Horse Power..... 200.
Three-Horse Power... 250.

Call and Examine OR SEND FOR AN ILLUSTRATED CATALOGUE.

P. BLAISDELL & CO.

Manufacturers of



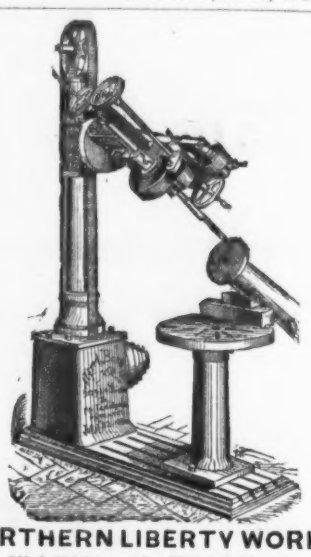
MACHINISTS' TOOLS,

Blaisdell's Patent Upright Drills,

With Quick Return Motion.

Engine Lathes, Planers, Boring Mills, Gear Cutters and Hand Lathes.

WORCESTER, MASS., U. S. A.



NORTHERN LIBERTY WORKS,

312 & 314 Greene St., Philadelphia, Pa.

ALFRED BOX & CO.,

Manufacturers of

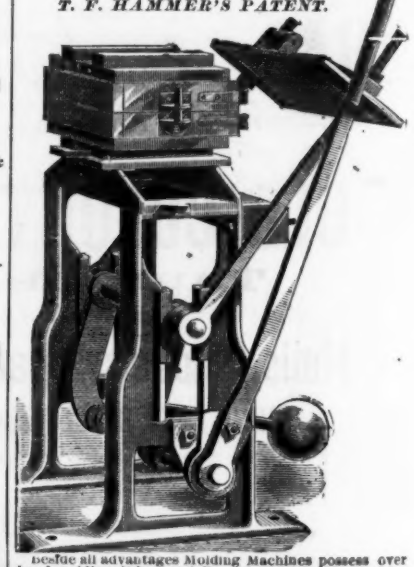
Machinists' Tools, Pulleys, Shaftings and Hangers.

Patent Universal Radial Drills, Steam Hammers, Boiler Makers' Outfits.

MOLDING MACHINE.

Prices Reduced.

T. F. HAMMER'S PATENT.



Beside all advantages Molding Machines possess over hand molding, it is especially claimed for this machine that it requires no special flasks or boards but the same are used as for hand molding; it occupies no more room than a bench for hand molding; it produces at less cost more, smoother and uniform castings.

Price list on application.

T. F. HAMMER,
Sole Manufacturer, **Branford, Conn.**

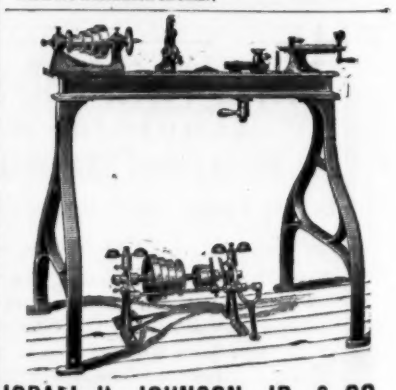
Malleable Iron Castings made to order.

STEARNS MFG. CO.,

ERIE, PA., Manufacturers of

Engines, Boilers and Saw Mill Machinery.

Send for illustrated circular.



ISRAEL H. JOHNSON, JR. & CO.,

TOOL & MACHINE WORKS,

Manufacturers of Engine, Brass Finishers', Wood Turners', Amateurs' and Jewelers' **LATHES,** Slide Rest, Screw Machines, Turret Heads, Screw Presses, Screw Clamps, Lathe Carriers, &c.

440 N. 12th St., above **Noble, Philadelphia, Pa.**

Israel H. Johnson, Jr., Joshua R. Johnson, Jr.

CHAS. FORSCHNER,

Manufacturer of

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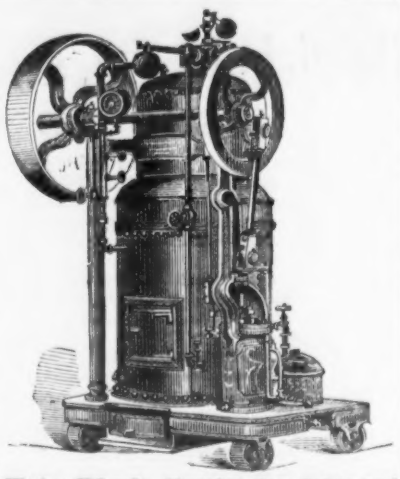

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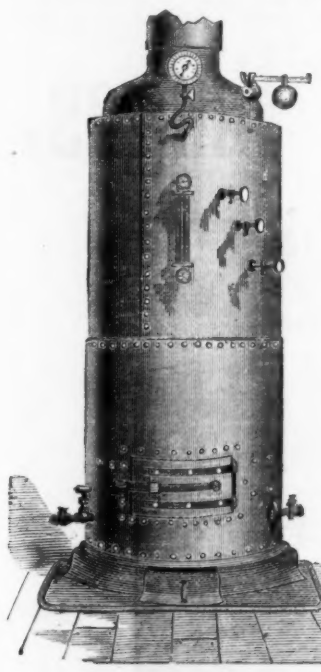

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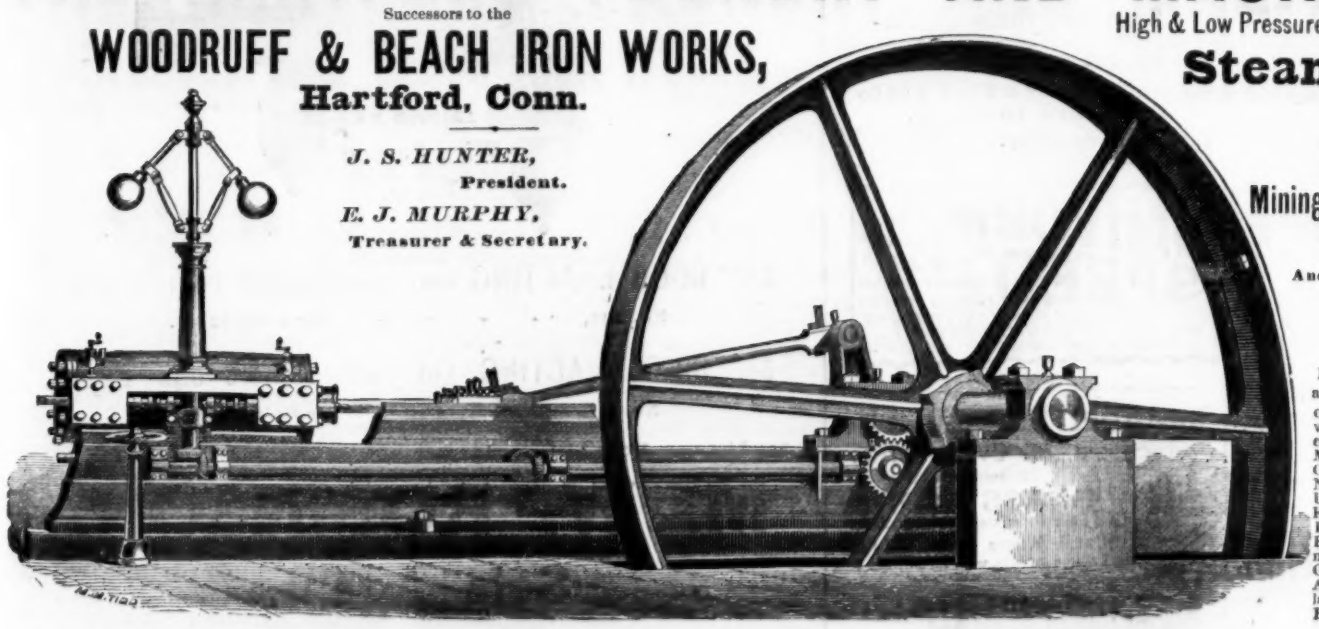

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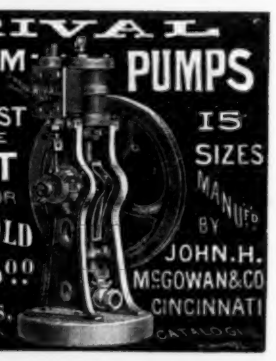

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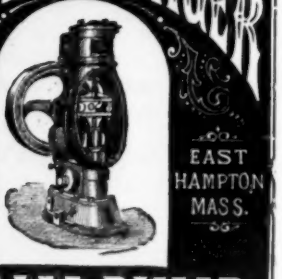

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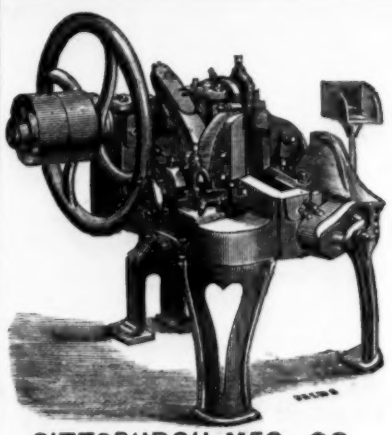

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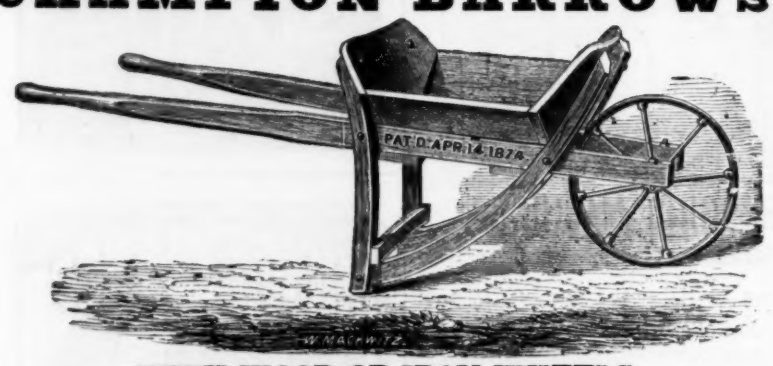

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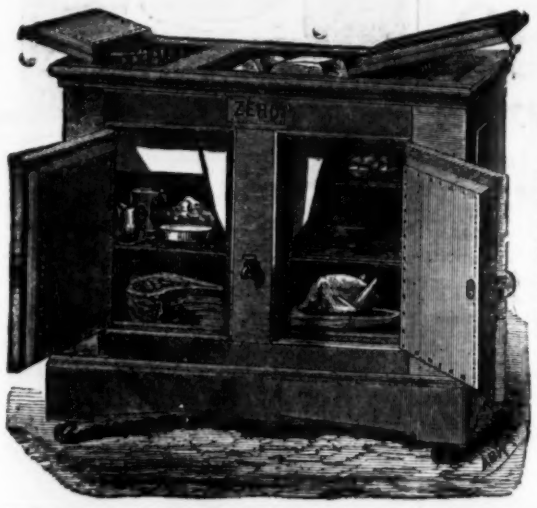

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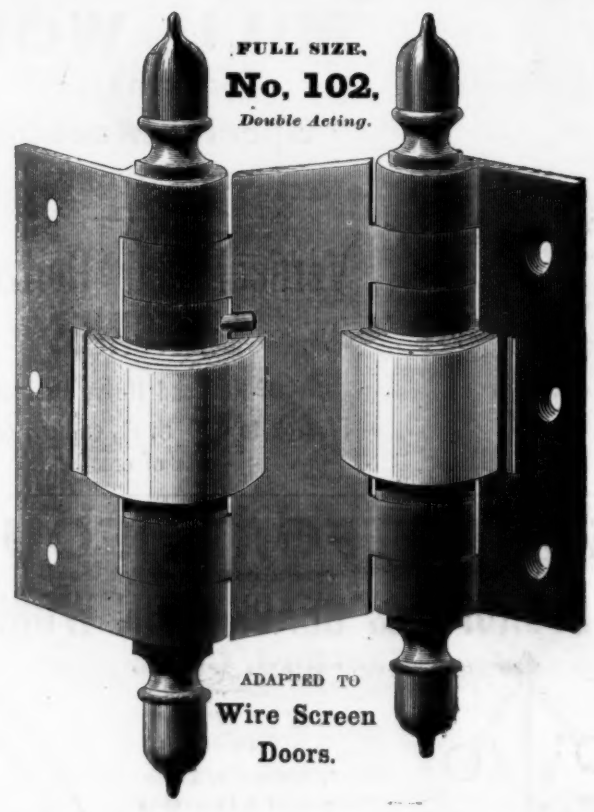

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